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Telephony

NOVEMBER 27, 1937 VOLUME 113, NUMBER 22

Public Relations:

Its Effect on Growth Of the Telephone Industry

By ERNEST WATSON

General Commercial and Traffic Superintendent, Associated Telephone Co., Ltd., Santa Monica, Calif.

AIM IN SALES PROMOTION to increase amount of business per customer. In securing more than a minimum of business from telephone subscriber, public relations plays vital part. Competition for customers' dollars met by anticipating requirements of telephone user, providing improvements and conveniences before subscriber knows he wants them. Part every employe plays in tearing down or building up this greatest asset of a telephone company. Presented at commercial division conference during convention of U. S. Independent Telephone Association

The careless and inconsiderate installer brings about an unfriendly feeling between the customer and the company.

THE TERM "public relations" as used in a public utility company—and also non-public utility companies—refers, I believe, to the feeling of the customers toward the company. In the telephone business if our methods, practices and policies meet with public favor, public relations are said to be good; and, conversely, if the methods, practices and policies are in disrepute, public relations are said to be poor.

Public relations is a term somewhat akin to good will. Each expression refers to an intangible asset which, if maintained at a high level, is the greatest asset any company can have. Although regulatory bodies, in general, include no allowance for this intangible asset when computing the return to which a company may be entitled on its operations, it is most important that public relations be maintained at a very high level in order that a company may secure a reasonable return on its tangible property.

It is generally felt that a public utility operates without competition but this is only true in one respect: that it has exclusive rights to serve a given territory. It is now generally recognized that public utility companies are in strong competition with other lines of industry and business and with one another, as to the amount of business any one customer will do with them.

In this respect it is necessary for a telephone company to merchandise its product—telephone service—in a manner comparable to that being followed by other utilities and non-utilities, such as power companies, automobile manufacturers and radio manufacturers.

There was the time in earlier days when telephone companies were satisfied to have one primary service for a business concern or a residence. Likewise, there was a time when power companies were satisfied to sell electricity to consumers for only lighting purposes, when the aim of automobile manufacturers was to sell one automobile to a family, and radio manufacturers felt fortunate in having one radio to a home.

The situation is now changed. We find power companies in a strongly competitive field, endeavoring to increase the amount of business per consumer. Not only do they desire

to market electricity to the home for lighting purposes, but also for refrigeration, water heating and cooking.

We find automobile manufacturers stressing the convenience of two automobiles per family and radio manufacturers advertising the convenience of additional radios for the kitchen, bedroom, study and the automobile. It is thus quite evident that whether the business be a public utility or non-public utility, the aim is to increase the amount of business each person does with the concern, and telephone companies should strive to increase the amount of telephone service per residence and business customer.

Most everyone whose income is in the average income bracket or above must have a telephone in his residence. Most every business must likewise have a telephone. Due to the fact that we generally serve exclusively in a territory, there is no option on the part of the customer in the matter of his first telephone.

Referring to the title of this paper, "Public Relations and Its Effect on the Growth of the Telephone Business," it should be our aim to so develop the feeling of the public toward us that each and every customer is glad to do business with us and, being glad, will be inclined to subscribe for more service than the minimum which he is practically forced to have whether or not he likes our way of doing business.

If in our conduct we please residence customers, the way is paved for placing more than one telephone in the home, or probably a jack and plug installation, additional listings and supplemental equipment.

If our daily conduct has the approval of the business customer, we find private branch exchanges, multiple line key cabinets, wiring plans and other rather extensive installations rather than just the telephone which the business man must take whether he approves of our business methods or not.

Keeping Stride with Competition Outside Industry

In these days when automobile and radio manufacturers and others are rapidly changing models, styles and designs, we should realize the necessity of keeping stride with such competition for the customers' dollars. This can only be done by anticipating public requirements, not only relative to the kind of service rendered—that is, whether it be magneto or common battery, manual or dial—but also in the appearance of the instrumentalities and the telephone arrangements which may be had by customers.

For example, we in southern California were credited by our customers with a very forward step when the wall-mounted handset was adopted. We are now confronted with the self-contained hand-type desk-set problem. I do not know whether other companies have experienced the reaction toward instrumentalities which is brought about by the motion picture industry. The considerable demand upon us for self-contained handsets has largely come about because of their use in recent motion pictures. In the same way has been created a demand for colored instrumentalities and other special telephone arrangements.

In my opinion every telephone company should resolve to follow a definite policy of making arrangements to meet any reasonable request, so long as the revenues of the company are not adversely affected or general telephone service impaired.

Then, too, we have for consideration the feeling toward us of regulatory bodies, civic authorities, service clubs and other organizations. We find, in looking back into history, many cases where telephone companies argued against changes which were suggested by regulatory bodies and others. If concentrated thought had been devoted to the problem, such companies could have seen many occasions in which such requests might have been met without adverse reaction on earnings or service and with improved public relations.

There was the time, for example, when base rate areas would not be extended until pressure was brought to bear against the company. If careful review were made of the majority of these cases, it would be found in all probability that the base rate areas were ultimately extended over the objection of the company.

How much better it is for us to constantly survey the territories we serve and anticipate necessary changes. How much better it is for us to voluntarily extend base rate area boundaries to include newly-developed sections when no complaint is on file against us rather than to await a complaint, argue the case, ultimately move the boundary anyway and have to live down a bad public reaction.

It may seem superfluous for me to relate certain means of building up and sustaining good public relations. We find this originates in every department of the company from the truck driver to the executive office.

The man in charge of the truck or automobile, with the company emblem boldly displayed on either side, may seriously impair the company's public relations by breaking traffic rules and being discourteous. Likewise the installer who walks into a customer's home in unsightly clothing, with his hat on, and lays his cigar on the mahogany table, brings about a most unfriendly feeling between that customer and the company.

Every Department Sustains Public Relations

It is obvious that under such circumstances the customer will do no more business with us than he is forced to. His feeling will be spread to friends in social gatherings and business associates, in service clubs, and other organizations.

Construction forces also may affect public relations adversely by doing such things as locating poles improperly or damaging the subscriber's lawn through carelessness and thoughtlessness.

In manually-operated exchanges maximum station development and quantity of service per customer can only be brought about through friendly, courteous treatment accorded the public by the operators; and, undoubtedly, the quantity of toll usage per customer in all areas is directly affected by the speed of completion, the voice of the operator and the efforts of the operator to meet the customer's requests for information and assistance.

Subscriber's Contact Begins With Commercial Office

In our day-to-day work public relations are greatly affected by the conduct of the commercial employes. It is here where the contact with the customer begins and ends. The customer's lasting impression of the company is undoubtedly formed by his first contact with the service representative.

If, at the counter, he is met with a smile and our representative appears to be glad that the applicant came in to do business, and if, without haste, the representative appears ready and willing to aid the applicant in deciding upon the class and grade of service and type of equipment which best meets the applicant's telephone requirements, we have then started out correctly and there should have been created a lasting, favorable impression.

At this point I cannot help but stress the strong competition with which we are confronted in the way of meeting customers' requests. We find today in our dealings with railroads, mercantile stores and other businesses that they endeavor to serve us without delay. It is, therefore, quite imperative that telephone companies do likewise.

We know that they probably were never in greater disrepute than in the days of rapid development, when applicants were required to wait anywhere from two weeks to six months for telephone service. Any man acquainted with the commercial phases of the telephone business, particularly as related to the public's opinion of us, knows the tremendous value in having our service representative accept an application for service with:

"Thank you, Mr. Jones, for giving us an opportunity to serve you. Will it be convenient to you if the service is established the day after tomorrow?"

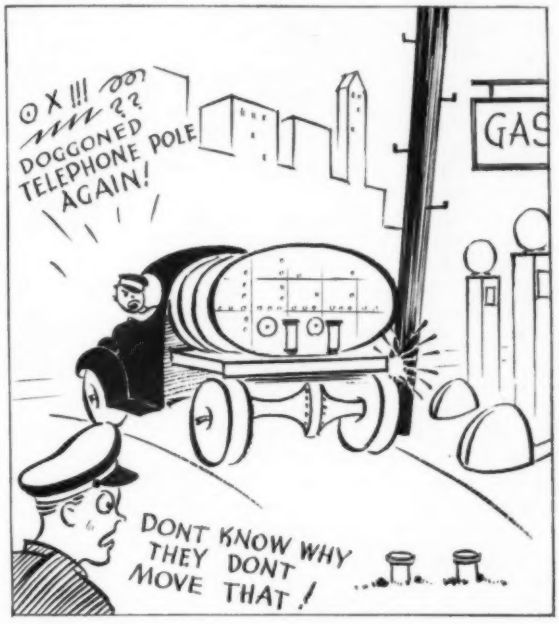
This will give him an opportunity to speak up and tell us if there is an emergency which makes an immediate installation very desirable.

In my opinion, group agitation against the company, which has a most detrimental effect on the growth of the business, can only be prevented by our ability to render telephone service without delay. In order that this may be done it is important that we so arrange our plant and equipment, by constantly surveying our territories, that there is adequate spare capacity to meet any reasonably-anticipated demands.

The original impression created by the service representative must be carried through by the current account collectors and adjustment clerks. If we adhere strictly to our rules and regulations relative to the requirements for payment and without due consideration disconnect telephone services for non-payment, station development is adversely affected. If, in current account work, we endeavor to cooperate with the customer and follow the principle of not using the disconnection of services as a means of effecting collection but rather as a means of protecting us from further loss of revenue, our station development will be maintained at the highest level.

At this point it seems important to stress the coordination which must exist between our collection forces and service representatives. The collection people can only reduce uncollectibles to a minimum by utter disregard of station development and public relations. Likewise, the service representative and salesman can only bring about the maximum development in number of customers and quantity of business per customer by utter disregard of the customer's ability to pay.

In striking the proper balance each force must recognize and be in sympathy with the objectives of the other. Service representatives must be mindful of controlling sales so that we are not exposed to unsatisfactory credit risks and the collection people must be extremely tolerant in dealing with customers in order to protect the business which has been obtained by service representatives and salesmen.



A telephone company should resolve to follow a definite policy of making arrangements to meet any reasonable request of a subscriber.

Adjustment Clerk Plays Part in Station Development

The adjustment clerks play a very important part in station development and volume of business per customer. A serious argument with the customer over a 10-cent toll charge may reduce that customer's toll usage many dollars per month, or even lose him as a subscriber to telephone service. In the matter of adjustments, we can only feel our public relations and development of business are being properly protected if the customer is given the benefit of doubt when our records do not clearly substantiate our charges.

During the period a company or an individual is our customer we cannot hope to have him do more business with us unless his every request or complaint is given prompt and courteous consideration.

Upon the termination of service we have the serious problem of collecting final accounts. In this regard our employe should be mindful of the fact that the debtor may subsequently return to our territory or again be in a position to subscribe for service and, if our treatment pleases him, he will again be more than anxious to do business with us. In this matter of final account collections it is imperative that we cooperate with the debtor and endeavor to arrange for payment of the account without causing him too much inconvenience.

We have found that if the debtor cannot settle the account with us at the time of discontinuance of service, a favorable impression is created by the use of an extension agreement under which he is allowed a reasonable extension of time for partial payments from month to month.

In mentioning the items which may affect public relations and influence customers' decisions as to whether or not they care to do business with us, we should not overlook the public's opinion of the telephone company organization. We cannot expect to increase to the maximum the station development, the quantity of service per customer or revenue per customer unless the public feels that our organization is a happy, contented group of employes.

Each employe is a salesman for the company, not only in selling telephones but in selling the public on the idea that he works for a fine organization which understands the telephone business and strives in every way possible to render the best

and most efficient service. This feeling can only start from the management of the company but it grows throughout the organization.

We can only reach the maximum station development and quantity of business per customer by having each and every employe ready to courteously and defend our methods and practcies.

Any talk on public relations could not be concluded properly without referring to the tremendous influence our standing in public opinion has when it becomes necessary to renew franchises or secure money for the expansion of our plant.

In conclusion, I wish to point out that in the matter of public relations it is not sufficient that we satisfy the large majority of our customers but rather that we shall cause each and every customer to have a friendly feeling toward us and want to do business with us.

All of us know that public agitation against a company nearly always starts with a single individual. Likewise, we know that our greatest sales medium is through satisfied customers. An individual is just as ready to praise the company, if he is pleased with our method of serving, as he is to condemn us if dissatisfied.

If, in our daily contact with customers, we exert every effort to please, or at least appear to be in sympathy with the customer's viewpoint, then and only then will the company achieve maximum station development and quantity of business per customer.

▼ ▼

A. T. & T. Calls 1939 Debentures for Redemption

The executive committee of the American Telephone & Telegraph Co. has called for redemption on January 3, at par and accrued interest, $12,923,000 of the company's ten-year 4½ per cent convertible debentures due July 1, 1939. The call price will fall from 105 to 100 on January 1.

These securities are the remainder of an issue of $219,112,700 sold to stockholders in May, 1929, at par, in the ratio of $100 of debentures for each six shares of stock. They were convertible into stock at $180 a share, beginning with 1930, but the conversion price was adjusted to $166.88 a share owing to the issuance of additional shares for subscription by stockholders of record May 23, 1930. The present conversion price is $183.74. The conversion privilege will expire on December 31.

In 1930 $206,029,200 of the debentures was retired through conversion into capital stock. At the present time, with A. T. & T. stock selling slightly below 150, there is no advantage in converting the debentures, and only a slight advantage existed at the year's high price of 187 for the shares. The debentures declined 2½ points to 100¾ yesterday.

In 1936 and the early part of 1937 the company called for redemption three issues of 5 per cent bonds and debentures aggregating $332,850,000, funds for the purpose having been provided mainly through the sale of $335,000,000 of 3¼ per cent debentures in two issues in the final months of 1936.

Retirement of the convertible issue leaves outstanding, in addition to the new 3¼s, an issue of $95,170,700 of 5½ per cent debentures due November 1, 1943, which are redeemable at 110 until May 1, 1941, and thereafter at par.

▼ ▼

A "Magic" Telephone

Strange stories come out of Hollywood. For instance, it is said that Dick Purcell, movie player, has a locking relay on his telephone which responds to a certain word only. When this word is spoken into the transmitter, connection with the operator can be made. Purcell claims that this system keeps other persons from making calls over his telephone.

The Operators' Corner

By MRS. MAYME WORKMAN

Traffic Supervisor, The Illinois Telephone Association, Springfield, Ill.

ENTHUSIASM, the emblem of energy, makes duty a pleasure. No. 308

IF THERE IS any one thing which will prevent an individual or business from becoming successful, it is lack of enthusiasm. Every success is filled with enthusiasm; every failure lacks enthusiasm. To possess this quality we must have faith, backed by a hopeful, buoyant spirit of service.

Enthusiasm is the emblem of energy. It tells you where you are today, and predicts where you will be tomorrow. Without it you are simply chasing the rainbowed promise that recedes as you pursue. When you go through a day utterly devoid of enthusiasm, you are just like a lazy stream of water, flowing its easy, sluggish, downhill course.

Enthusiasm makes duty a pleasure. Papyrus has this to say of it:

"If you can't get enthusiastic about your work, it's time to get alarmed. Something is wrong.

Compete with yourself; set your teeth and dive into the job of breaking your own record.

No man keeps up enthusiasm automatically.

Enthusiasm must be nourished with new actions, new aspirations, new efforts, new vision. It is a man's own fault if his enthusiasm is gone; he has failed to feed it.

And right here is the big reason why thousands of men hit high-water marks at 35 and then recede. They can 'do their work with their eyes shut,' and that is the way they do it. They have lost the driving power of enthusiasm. They sleep at the switch. All they see in life is the face of the time clock. All they hear is the quitting whistle.

If you want to turn hours into minutes, renew your enthusiasm."

And we might add that it is better to be fired by enthusiasm than to be fired by the boss.

It is easy to pick out the operators who lack enthusiasm. They begin to slow up shortly before quitting time. They are more concerned about what they are going to do when they get off duty than with the work at hand. If a signal appears they make a listless effort to answer it but are quite content to permit some other operator to take the call. Fortunately, only a small percentage of operators have permitted their enthusiasm to go to sleep.

Questions from Illinois Operators

1. Should you release the cord you are holding before taking down another connection?
2. Is there a report charge on a station-to-station call if the charge is not accepted?
3. What is the correct way to pass a two-number ticket?
4. What steps should be taken when a subscriber says they are going to report you to the commission?
5. How long do you wait between reports before giving subscriber a report after the first report has been given?

The answers to these traffic questions are given on page 30.

Mathematics For Telephone Engineers

By H. H. HARRISON

ARTICLE EIGHT, SECTION IV, of this mathematics series, continues the discussion of vectors, with this section taking up the logarithmic or equi-angular spiral. The three foregoing sections on vectors appeared in the issues of July 24, August 28 and September 25. This mathematics series, written especially to aid telephone engineers in handling alternating current problems, was begun in TELEPHONY of May 30, 1936

FIG. 160-a represents the equation $Z = A + jpB$ for varying values of p. If A is a constant resistance and $pB = wL$, a reactance, the radii vectors represent Z as p is varied.

The square root of Z for differing values of p is numerically equal to $\sqrt{Z}$ and has a slope equal to half the slope of the corresponding value of Z. The maximum slope of Z is 90° for an infinite frequency and, therefore, the maximum slope of $\sqrt{Z}$ is 45°. These slopes are, of course, never attained in practice.

The curve connecting $\sqrt{Z}$ with p is given by Fig. 160-b. As p increases towards infinity, the slope of $\sqrt{Z}$ approaches 45°, as will be understood. The curve of $\sqrt{Z}$ forms one branch of a rectangular hyperbola with the 45° line as one of its assymptotes.

The behavior of a circuit having lumped constants, R, L, and K, Fig. 161, over a band of frequencies is a good example of the usefulness of graphic methods of representation. In Fig. 161-a the vector, R, represents the resistance. The net reactance is the algebraic sum of jwL, the inductive reactance, and —1/wK, the capacitative reactance.

jwL is a sloping straight line and it is only necessary to calculate its value at one frequency and erect an ordinate on the base line at a point representing the chosen frequency to scale. A straight line, drawn from the origin of the frequency base line and meeting the ordinate, will give jwL for all intermediate frequencies and for frequencies beyond the one selected.

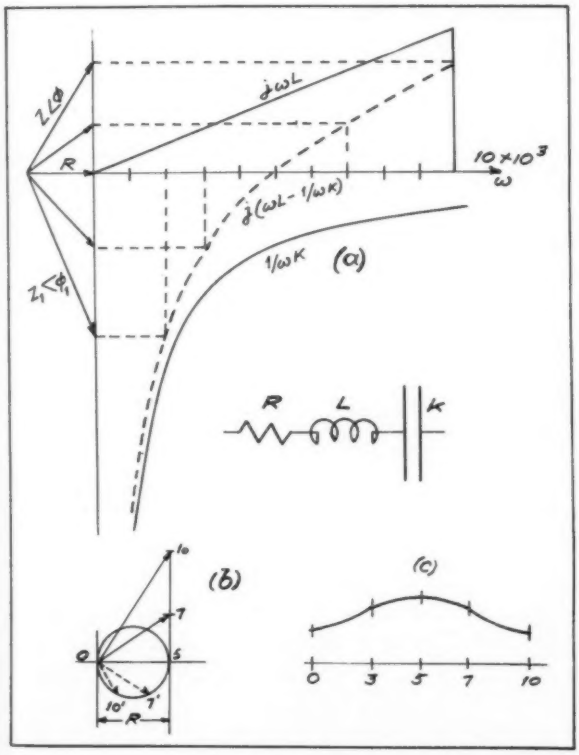


Fig. 161. Showing Response of a Resonant Circuit to a Band of Frequencies.

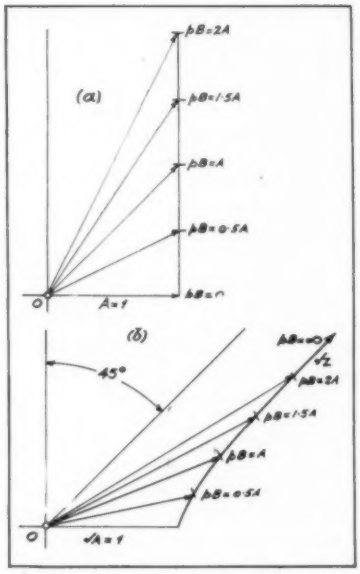


Fig. 160. Locus of $Z = A + Bp$ and $\sqrt{Z} = \sqrt{A} + Bp$

The condenser reactance is of the form 1/x and is, therefore, a rectangular hyperbola. Only one ordinate need be calculated, that at the first frequency, and subsequent ordinates will be ½, ⅓, ... 1/n of this.

The net reactance $j(wL - 1/wK)$ is obtained graphically by subtracting the two ordinates from each other, which process yields the dotted line of Fig. 161-a.

Projecting the ordinates of this curve on the vertical line at the origin of the frequency base line and joining the intersections thus produced to the point where $R = O$, the impedance, Z, is obtained at various frequencies, and the angle ϕ which Z makes with the horizontal is simultaneously given.

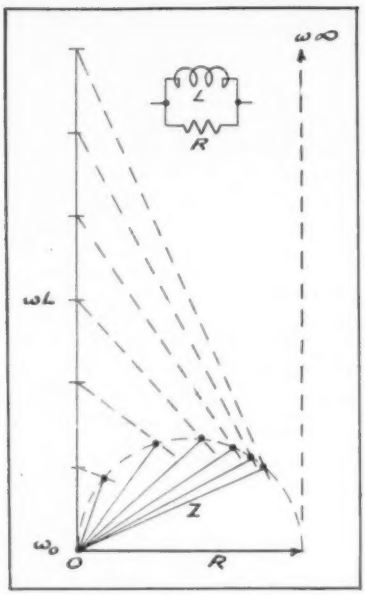


Fig. 162. Impedance Locus of a Pure Inductance in Parallel With a Pure Resistance.

With constant voltage, the current at the various frequencies may also be obtained graphically. Since $I = V/R$ and $1/R = G$, the conductance, then $I = VG$ and any curve giving G over the frequency range will represent to some scale the varying values of I.

Conductance is the inverse of the impedance; and if the one is represented by a straight line, the other will be a circle. In Fig. 161-b, the impedances for three frequences have been drawn on the resistance as a base, R. Their inversions are the dotted lines in the lower half of the circle, and the length of these to some scale represents the values of the current and its phase with respect to the applied voltage. The portion of the sloping lines above the horizontal axis intercepted by the circle are the conductances and also the currents for the impedances lying below this axis and not shown.

Fig. 161-c shows the variation of current with frequency. It has a maximum value at frequency 5×10^5, since at this frequency the two reactances are equal and opposite to each other and the impedance Z reduces to a simple resistance of value R, the condition of *resonance*. The curve is very flat because the value of R is such that it produces considerable damping and the resonance curve, as 161-c is called, is, in consequence, "blunt."

The reader will find it instructive to draw the curves of Fig. 161 for varying values of R and note the influence of the latter on the resonance curve. Suitable values to take are: $R = 10$, 15, 30 ohms, $K = 1 \times 10^{-6}$ farads, and $L = 0.04$ henry.

Fig. 162 shows the variations of impedance with frequency of a pure resistance in parallel with a pure inductance. This is a case of two vectors at right angles to one another. The joint impedance is given at any frequency by a line drawn from O and perpendicular to the dotted line joining the resistance and reactance, as has already been proved.

The locus of the impedance is a circle. At w = infinity, the impedance becomes equal to R.

Fig. 163 is the impedance locus of a pure resistance in parallel with a pure capacity. This is again a semi-circle

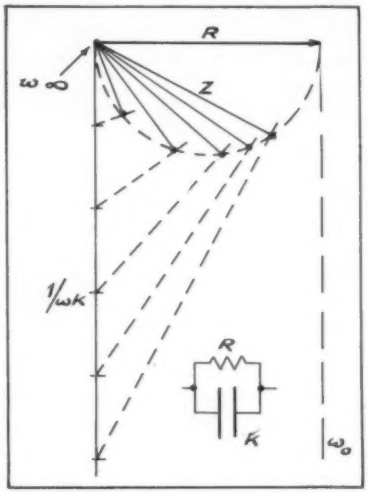


Fig. 163. Impedance Locus of a Pure Resistance and a Pure Capacity in Parallel.

but is situated below the horizontal axis. The construction is exactly the same as for the previous figure.

The Logarithmic or Equi-angular Spiral

Fig. 164 is a graph of the logarithmic curve, or equi-angular spiral, which finds considerable application to telephone transmission problems. Radii vectors have been drawn for positive and negative angles, each multiples of 30°. This spiral has the peculiarity that the tangent, T, to any radius vector makes a constant angle ϕ with the radius vector at that point.

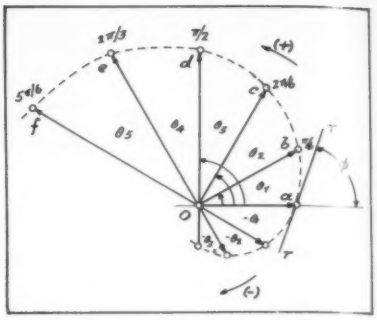


Fig. 164. The Logarithmic or Equi-Angular Spiral.

Fig. 165 represents a curve, PQ, traced out by a radius vector, OA, which undergoes successive angular displacements of 1/n radians and increases in length at each step. The constant angle is 45° in this case.

If 1/n is made very small, the arcs AB, BC, CD, etc., can be considered as short straight lines. aA, bB, cC . . . are perpendiculars from OB, OC, OD . . . dropped onto the vectors preceding them. Angles ϕ are each of 45°.

The small triangles are isosceles triangles and aA = aB, bB = bC, and so on. Also, since 1/n is assumed to be very small, OA = Oa, OB = Ob, etc., without measurable error. Further, Aa, Bb, Cc . . . are equal to OA, OB, OC . . . multiplied by the angle $\Theta = 1/n$ radian.

In consequence:

If $OA = 1$

$$OB = Oa + aB = Oa + Aa$$
$$= Oa + (Oa) \times 1/n$$
$$= Oa(1 + 1/n) = 1 + 1/n$$

$$OC = OB + bC$$
$$= OB + Bb$$
$$= OB + OB/n$$
$$= OB(1 + 1/n)$$
$$= (1 + 1/n)(1 + 1/n)$$
$$= (1 + 1/n)^2$$

$$OD = OC + cD$$
$$= OC + Cc$$
$$= OC + OC/n$$
$$= OC(1 + 1/n)$$
$$= (1 + 1/n)(1 + 1/n)^2$$
$$= (1 + 1/n)^3$$

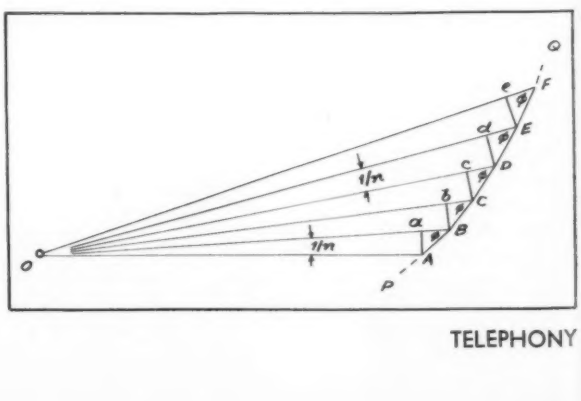


Fig. 165. Graphic Proof of the Equation Giving the Logarithmic Spiral.

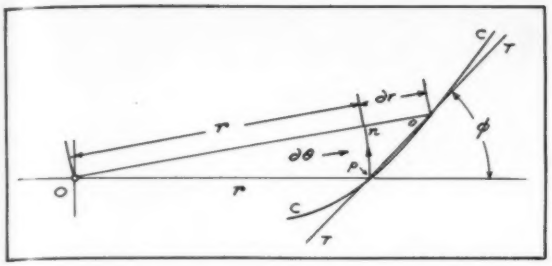


Fig. 166. Diagram to Prove the Law of the Logarithmic Spiral.

The following table is useful.

Rad. Vector	Angle
1 inch	0 radian
$1 + 1/n$	$1/n$
$(1 + 1/n)^2$	$2/n$
$(1 + 1/n)^3$	$3/n$
$(1 + 1/n)^n$	$n/n = 1$ radian

If $n \to$ infinity, $(1 + 1/n)^n = \epsilon = 2.7183$ ..... and, as a consequence,

$(1 + 1/n) = n\sqrt{\epsilon} = \epsilon^{1/n}$

$(1 + 1/n)^2 = (\epsilon^{1/n})^2 = \epsilon^{2/n}$

$(1 + 1/n)^3 = (\epsilon^{1/n})^3 = \epsilon^{3/n}$ and so on.

Therefore,

Rad. Vector r	Angle θ
1 inch	0 rad.
$\epsilon^{1/n}$	$1/n$
$\epsilon^{2/n}$	$2/n$
$\epsilon^{n/n}$	$n/n = 1$ radian

The equation to the curve is thus seen to be $r = \epsilon^{\theta}$ in which the radius vector is a power of ϵ, the index expressing the corresponding angle in radians.

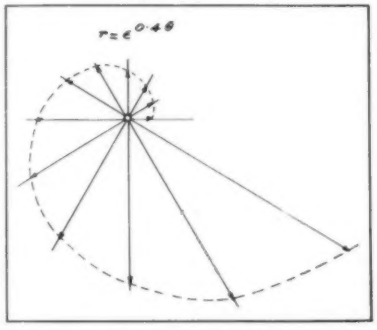


Fig. 167. Graph of the Spiral $r = \epsilon^{0.4\theta}$.

$\theta = \log^{\epsilon} r$ and angle in radians is thus the naperian log of the length of the radius vector, the curve is a graphic table of logarithms and hence the name of logarithmic spiral.

If $\theta_1 = \log_{\epsilon} r_1$ and $\theta_2 = \log_{\epsilon} r_2$ then $\log_{\epsilon} r_1 - \log_{\epsilon} r_2 = \theta_1 - \theta_2$, or $\log_{\epsilon} (r_1/r_2) = \theta_1 - \theta_2$.

If an element of a log curve CC (Fig. 166) is examined, it is evident that as $r + dr$ approaches r and $d\theta$ becomes smaller and smaller, the curved sides of the small triangle, nop, become straight, and when op is infinitesimal, $\angle$nop becomes angle ϕ, since p, o, coincides with the tangent TT.

In tracing out the curve CC, the radius vector undergoes two changes: a circular change or rotation, and a stretch or extension along its length. These two variations are at right angles or in quadrature with one another and the vector is said to trace out a complex angle $(a + jb)$.

In the small right-angle triangle nop, cos nop = no/op and sin nop = np/op. $\angle oOp = \triangle\ \theta$. Also np/po = sin oOp. Therefore,

$$np = pO \sin oOp$$
$$= r \sin d\theta.$$

The last equation may be writen $r \cdot d\theta$ since when θ is small, $\sin d\theta = d\theta$. Now $\cos \phi = no/op$ and $\sin \phi = r \cdot d\theta/op$; therefore, $\tan \phi = \sin\phi/\cos \phi = r \cdot (d\theta/dr)$, since $\cos \phi = dr/op$.

If $r = r_o\epsilon^{k\theta}$, $dr/d\theta = kr_o\epsilon^{k\theta}$

$d\theta/dr = 1/(kr_o\epsilon^{k\theta})$

$r_o \cdot d\theta/dr = r_o\epsilon^{k\theta}/kr_o\epsilon^{k\theta} = 1/k$

Therefore, $\tan \phi = 1/k$, a constant, and $k = 1/\tan \phi$. The equation to the curve may thus be written:

$$r = r_o\epsilon^{k\theta} = r_o\epsilon^{(\theta/\tan\phi)}$$

It is more convenient, in designing a curve, to write $1/\tan\phi$ as k and to use the form $R = R_o\epsilon^{k\theta}$.

In the spiral $r = \epsilon^{\theta}$, if $\theta = 2\pi$—that is, if the radius vector has made one revolution—$r = \epsilon^{6.2832} = 537$ inches or feet, according to the unit length chosen for the initial vector at $\theta = 0$.

If it is specified that r shall be 12 inches after one complete revolution of the radius vector, then,

$12 = 1\epsilon^{2\pi k}$ and $\log_{\epsilon} 12 = \pi k$, from2 which $k = \log_{\epsilon} 12/2\pi$ and $\tan \phi = 1/k = 2\pi/\log_{\epsilon} 12 = 2.5$. $\phi = 68°12'$.

The spiral is given in Fig. 167.

As has been stated, the log spiral is a graphic table of hyperbolic logs. It is possible to obtain a spiral for common logs. Thus, if $r = e^{k\theta}$ so that $r = 10$ when $\theta = 1$, then $10 = e^k$. Taking logs, $1 = k \log_{10} e = 0.4343 \times k$, and $k = 2.306$.

The equation of the common log spiral is, therefore, $r = \epsilon^{2.3026\theta}$. Tan $\phi = 1/2.3026 = 0.4343$ and $\theta = 23°\ 30'$ approximately.

Do not attempt to draw this spiral for, with an initial vector $r = 1$ inch, after one revolution $r = \epsilon^{2.3026 \times 6.2832} =$ 1,970,000 inches approximately.

The equation to the log spiral may be written $r = r_o\epsilon^{Px}$ where $P = a + jb$ and is complex.

Referring to Fig. 168, the initial and second vectors of a log spiral are shown. When θ is made small enough, triangles ab′a′ and abc are equal in all respects and angle $\phi = \angle$b′a′a. The hypotenuse common to both triangles represents the tangential displacement of the radius vector, and its components represent the increment in length, $dr = ac$, and the angular change, bc, in radians.

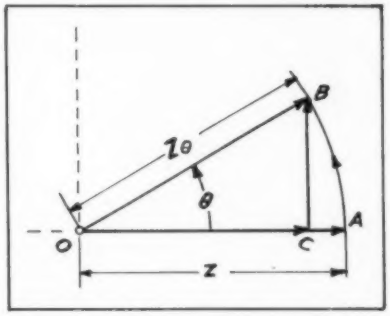


Fig. 169. To Represent the Action of the Operator $(\cos\theta + j \sin\theta)$ on Z $\angle$O°.

Vertical and horizontal components of any point on the tangent, TT, represent the total change in both for any given value ax, jbx. In transmission questions, P is called the *propagation constant* for reasons which will appear later. The equation could be written

$$r = r_o\epsilon^{ax} \cdot \epsilon^{jbx}$$
$$= r_o\epsilon^{ax}\ (\cos bx + j \sin bx).$$

Rotation of a Vector

Since multiplying a vector by -1 is equivalent to rotating it through 180° or π radians then, if n is a positive integer,

$(-1) \times (-1) \times (-1)$ ..... to n factors, or $(-1)^n$ represents the rotation of a vector through $n\pi$ radians.

(*Please turn to page* 38)

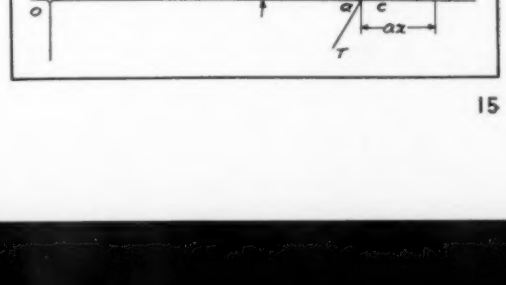


Fig. 168. Showing the Logarithmic Spiral as a Series of Tangential Displacements.

IN THE NATION'S CAPITAL

By FRANCIS X. WELCH

Special Washington, D. C., Correspondent for TELEPHONY

FCC WORKING UNDER its new functional organization. Some prognostications as to what will result from the special and regular sessions of Congress. Labor relations and opinion of the NLRB which may concern telephone companies. One comment on the tapping of Secretary of Interior Ickes' telephone

OFFICIALS and employes of the FCC ate their Thanksgiving turkey this week with somewhat mixed feelings about whether they should be entirely thankful for the recent turn of events. It was because this week the commission actually began to operate on its new "total commission" basis instead of the old tri-divisional set-up which officially went out of existence November 15.

The details of the new functional structure have been worked out for the most part and individual commissioners and subordinate officials have been assigned to specific tasks. Commissioners Walker and Brown will attend largely to telephone matters, but it is important to remember their activity will be confined to routine.

None of the substantive work (such as passing upon the merits of contested issues) which the old telephone division took care of, will any longer be acted upon by any other than the entire commission or a quorum thereof acting *en banc*, as the lawyers say. The idea, according to Chairman McNinch, is to have the individual commissioners dispose of simple uncontested or petty matters, so as to leave the commission, as a whole, free to consider broad policies and the really important controversies.

WHAT BOTHERS some of the underlings is that when all this reshuffling for efficiency is over and each one is told off to do this or that task, there may be found to be a few public servants left over. And economy is not the entire reason for suspecting that Chairman McNinch was not finished with his "purge" when he let out the three divisional directors some weeks ago.

For one thing it is known that Chairman McNinch is pretty peeved about leaks in the organization. Up to now certain news has leaked out about what transpired even in executive sessions. These stories have, on occasion, found their way into the newspapers before the news was supposed to be released. Chairman McNinch is determined to plug the leak or leaks at all costs and it may cost some jobs.

This trouble, it might be added, has not been particularly noticeable in the telephone division, although Commissioner Walker has some reason to complain about it.

THAT the current special session of Congress seems to be deteriorating into a modern version of the abortive Barebone's Parliament of 1653 should not surprise readers of this department. First of all, the calling of the special session is now freely, although unofficially, admitted by administration leaders to have been a blunder.

Here is Congress ready to go to work and none of the "big 4" bills recommended in the President's message ready for definite action. The crop control bill and administration reorganization bill are ostensibly in some kind of shape for floor action, but their integrity is the sheerest facade. Both of them will be torn to pieces like Christian martyrs if they are ever sent into the confessional arena without much more serious vote-aligning and wire-pulling behind the scenes.

As for the wages-and-hours bill, in which the Independent telephone industry probably has more immediate interest (because it might affect labor costs), the whole business is so hopelessly snagged in committee right now that it is almost futile to talk about it. The "seven TVA" bills have not even emerged from the stage of House committee hearings and nobody knows whether any one of the three bills on the subject is blessed by the administration or whether a White House measure is still to come.

THE TRUTH of the matter seems to be that somebody has sold President Roosevelt a bill of goods. The current filibuster over the anti-lynching bill (forecast by this writer, incidentally) has actually proven a temporary blessing in disguise because it has served to cover up what might otherwise be an indecent exposure of the administration's lack of even elementary preparation for the special session.

Were it not for the Southern members being diverted on the subject of lynching, the Senate would have nothing to do but twiddle its thumbs and think up what it might do on its own responsibility to kill time while administration leaders are catching up with their home work.

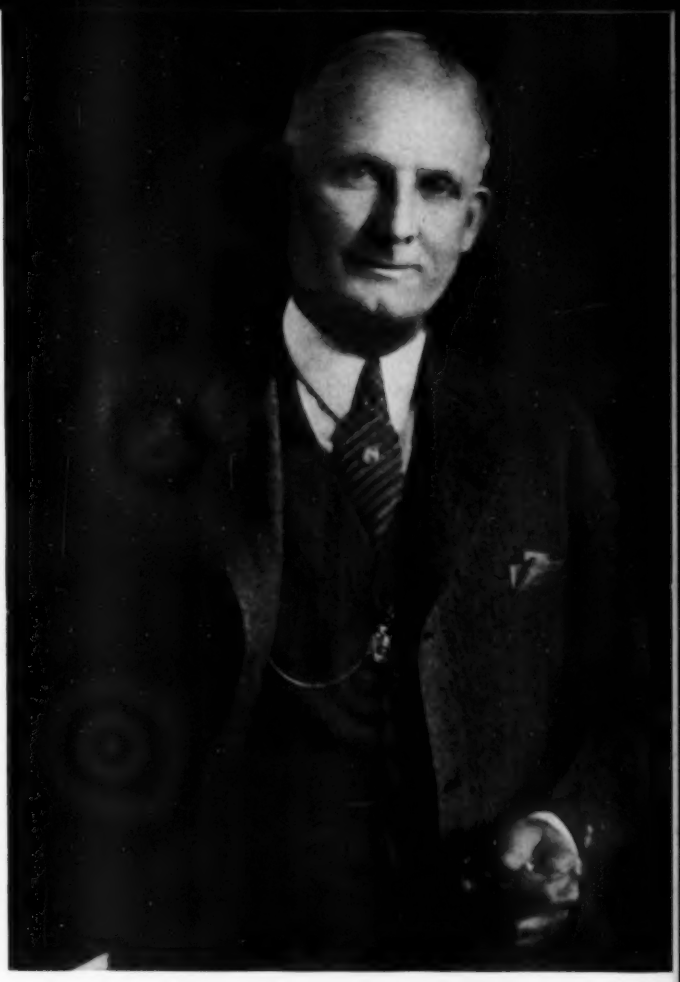
Needless to say, the old maxim about the idle mind being the devil's workshop is true enough from the viewpoint of an administration with an idle Congress on its hands. That is why the administration leaders made no move to kill off the lynching bill filibuster, fearing, with good reason, that the Senate might easily be much more mischievously engaged; in such matters as tax or neutrality law revision, for instance.

WELL, JUST to give a quick interim forecast of what to expect from Congress, here is the way your correspondent sizes up the present situation:

SPECIAL SESSION: Expect nothing—absolutely nothing of much more importance than the confirming of some diplomatic minister or a new postmaster for Cripple Creek Junction. Congress will talk and wrangle right into a short Holiday recess. The explosions and language will be terrific—especially if the business situation keeps getting worse, but the action will be nil.

(*Please turn to page* 35)

FIFTY YEARS in the Pay Station Business



MAJOR RESPONSIBILITY for present-day efficiency of telephone pay stations is due to inventive genius of George Alexander Long. This still young and vigorous man has for half a century been active in developing and popularizing the coin-collecting machine, first made available to the telephone industry through William Gray's original invention in 1877. Fascinating history of the Gray telephone pay station and attendant legal struggles. Decision of U. S. Supreme Court held Gray patents valid and pioneer in scope

FIFTY YEARS is a long time for a man to be in any one business but such is the record of George Alexander Long, president and general manager of the Gray Telephone Pay Station Co., Hartford, Conn.

It was in November, 1887, that Mr. Long first became identified with the design and manufacture of coin-collecting machines for the telephone industry. At the age of 16 he was commissioned to make the model of the first pay station. Today, a half-century later, Mr. Long has received international recognition for the continuous improvements he has added to William Gray's original idea. To him, more than any other man, is due the credit of the present-day perfection of this great modern device.

There is an interesting story connected with the development of the first pay station. William Gray was the man who first conceived the idea of making the telephone available to the general public through pay stations. He wanted to call a doctor for his wife who was critically ill. There was a telephone in a nearby factory, but when he asked permission to use it he was refused. Only after stating his urgent necessity to a company official was a grudging consent finally granted. His offer of payment met with a curt refusal and the explanation that its use was reserved for subscribers only.

This gave the idea to Mr. Gray, as he returned to work, that some way should be provided by which the general public, if willing to pay for telephone service, should be able to get it. Necessity was once again the mother of invention.

Gray knew of the attempts that had been made to establish public telephones with paid attendants, and that the expense made such service extremely limited and unprofitable.

Being naturally of a mechanical and inventive turn of mind, he began to work on plans for a machine that would replace the attendant. After working out several crude and unsatisfactory models, he took his problem to Amos Whitney, head of the famous Pratt & Whitney Co.

George A. Long was at that time a 16-year-old apprentice in the Pratt & Whitney factory. To him Mr. Whitney entrusted the work of constructing a practical machine from the crude models of Gray. After several trials and much labor a practical model was finally devised.

Money was now needed for experiment, development and promotion. Some years earlier Gray had invented and placed on the market the earliest form of chest protector used by catchers in baseball. Through this he had become acquainted with Charles Soby, then the financial backer of the local baseball team. He now placed before him his new invention, with which Mr. Soby was greatly impressed. As a result, the Gray Telephone Pay Station Co. was formed in 1891, the first officers being Amos Whitney, Charles Soby and William Gray. A few years later they were joined by the young George A. Long, the only one of this original company now alive.

The history of the growth of this institution is the story of two purposes: the steady improvement of the machine to its present practical perfection, and the gradual adoption of the system throughout the world.

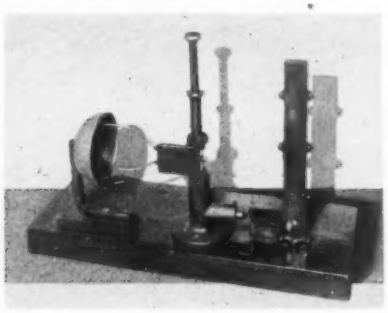
The first pay telephone was installed in Hartford in 1889, two years after the first model had been made. For the next 12 years the firm struggled along with only an occasional order. While the device itself was now satisfactory, it was necessary to create a demand for the pay station which still remained unknown to the general public.

The operating telephone companies offered little assistance, and Mr. Long found it necessary to organize a group of company representatives to call on hotels and other public places and explain what the machine would do. Generally they were met with a flat refusal when the proprietor understood that his patrons would have to drop a nickel into a slot before getting telephone service, for at that time customers were allowed to use the telephone for local calls without charge.

When the hotel man was made to understand that the majority of his patrons would prefer to pay for service and be free from obligation, only then would he sign a contract for the installation of one of the devices on his premises. This contract was brought to the operating telephone company, which then agreed to connect the pay station.

The Gray company furnished the instrument, and received as its remuneration a percentage of the gross receipts. This arrangement was fairly satisfactory, the proprietor getting 10 per cent of the gross receipts, the Gray company 25 per cent, and the operating telephone company the remaining 65 per cent. The records show that Kansas City was the last place where pay stations were installed on a rental basis; and in the returns, which were made monthly, it was found certain pay stations in that city collected as much as $3,000 each in a single year.

After the pay station had made some progress and proved itself a public necessity, it was copied in the same manner as are all other successful inventions, with the result that in the early part of the 20th century there were 25 different concerns building pay stations, all of which infringed the Gray patent.



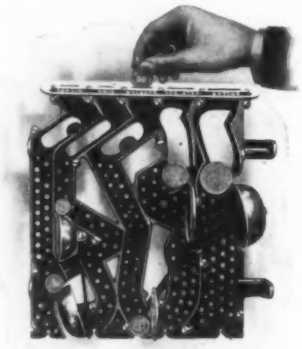
Old signaling device of the Gray pay station developed in 1889. With this apparatus the user had to push down the plunger to sound the signals on the bell after depositing the coin.

Suit was started in 1905 and carried through the highest courts in the United States with a final decision in favor of the Gray patents which were found not only valid, but pioneer in their scope. At the conclusion of this suit arrangements were made for settlement, there being no further court of appeal for the infringers from this decision.

The Gray company, in place of attempting to collect from the telephone industry all the traffic would bear to reimburse it for the loss sustained through these infringing devices, simply compelled the different manufacturers to stop infringement by destroying all the pay stations they had on hand and discontinuing further manufacture.

After the successful conclusion of this suit and the general acceptance of the idea of pay stations, which by that time was practically universal, the business troubles of the firm were at an end. From that point on it was a matter of keeping abreast of the times by constantly improving the machine itself and further expanding the use of the machine to all parts of the world. In both of these problems Mr. Long succeeded exceptionally well. Each time that a new machine was required because of a change in the operating system, it was ready; and today the company holds patents in five foreign countries.

George A. Long is the son of George S. Long, a noted American inventor, and Mary E. Brockway, daughter of one of Connecticut's renowned jurists, thus coming naturally by his inventive genius and keen power of analysis. Immediately after leaving school he served a four-year apprenticeship in the model department of the Pratt & Whitney Co. At the age of 20 he left to become foreman at the National Machine Co., where he personally had charge of building the first gasoline motors in the United States in that company's shops.



Signal device of the Gray pay station of about 1890. This invention, which placed the signals in the path of the falling coin, eliminated all movable parts such as levers and springs, providing quick service and low maintenance without confusion to the subscriber. This was an important step in the development of the modern pay station and has never been superseded.

Many of the men who worked with him at this time later became prominent figures in the automobile industry. It was during this period of his life that he developed a method for producing straight edges that was adopted by the Bethlehem Steel Co., and which has proved a very important contribution to the steel industry.

Both the British Westinghouse Electric Co. and the Gray Telephone Pay Station Co., at that time still a struggling young concern, offered Mr. Long attractive positions in 1901. He decided to remain in America and take charge of the Gray company, where he has remained ever since.

His success in this field is attested by the long and still-growing list of pay-station patents granted to him both in this country and abroad. Today he has to his credit more patents on telephone toll apparatus than any other single person.

▼ ▼

Life Insurance Advised For Old Age Security

The Northwestern Bell Telephone Co. is advising employes to insure their own old age security and protection for dependents by purchasing life insurance. The company has a plan whereby, under authority of the employe, sufficient amounts are deducted from payroll checks to meet life insurance premiums when they fall due.

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Why Not a Book for Christmas?

Books, wisely chosen, are always acceptable as gifts or desirable for personal purchase. With this thought in mind. TELEPHONY presents a list of selected telephone books with brief statements of their contents. Many of these books should also be on the reference shelves in the manager's office, available for use by employes.

• ELECTRICAL ENGINEERS' HANDBOOK, electric communication and electronics, volume 5, by Harold Pender and Knox McIlwain (1937); 878 pages $5.00

This reference book for communications engineers contains engineering data and formulae concerning modern networks. Discussions are presented of telephone circuits (local, toll and program facilities), radiotelephone systems, and high frequency transmission, profusely illustrated with line drawings, as are the other sections. These sections include acoustics, telegraphy, sound-reproduction systems, facsimile transmission, television, electronic control and navigation equipment.

• COMMUNICATION ENGINEERING, by W. L. Everitt (1937); 727 pages (second edition) . $5.00

Book designed for engineers and those with technical training; gives fundamental principles of telephone, telegraph and radio communication without going back to the beginnings of the entire electrical engineering field. Transmission networks and circuits, involving coupled circuits, impedance transformations, equalizers and bridge circuits are treated. Inductive coordination is discussed with the latest theories for minimizing interference. Discussion is given of other links in the circuits which make possible radiotelephony or carrier-current systems, including vacuum tube detectors and amplifiers. Mathematical ideas, beyond calculus, are introduced just before they can be applied.

• INDUCTIVE COORDINATION OF ELECTRIC POWER AND COMMUNICATION CIRCUITS, by Laurence Jay Corbett (1936); 161 pages $3.00

This excellent book discusses the nature of power transmission and of communication transmission, the effect of magnetic and electric induction and various influence factors. Susceptiveness and coupling factors, effects of conductor arrangements, transpositions in power and communication circuits and their coordination, power system wave shape, control of residual voltages and currents and many other phases are discussed. This book should contribute to a fuller understanding by power and communication engineers of each other's problems.

• TELECOMMUNICATIONS—ECONOMICS AND REGULATION, by James M. Herring and Gerald C. Gross (1936); 544 pages..... $5.00

Dealing primarily with the economic and public service aspects of the communications industries, the major purpose of this book is to evaluate existing state and federal regulation in the light of the requirements of national policy, as determined by the present federal administration. The subjects covered include the growth and development of the telegraph industry, submarine telegraphy, the telephone industry, the development and history of radio communication and broadcasting, state and Federal regulation of the communications industries.

• ELECTRICAL COMMUNICATION, by Arthur L. Albert (1934); 448 pages..... $5.00

Presentation of electrical theory of communication, including vacuum tubes, networks, filters, and discussion of entire industry. Various subjects considered as related to one another in modern communication systems. Designed as a college textbook and reference book for those having technical training. Others will find much of value in it, as use of mathematics has been limited but not at a sacrifice of engineering exactness.

• STORY OF INDEPENDENT TELEPHONY, by H. B. MacMeal (1934); 289 pages..$3.00

Following a brief history of invention and development of telephone, details are given of important part taken by Independents—operating men and manufacturers—in building-up of telephone industry. Readers obtain a clear and comprehensive view of what competition did for the telephone industry. Only history of Independent telephone group. Managers, directors and bankers find it valuable. Every telephone office should have a copy.

• TELEPHONE RATE-MAKING, by Edward Graham Baird (1934); 201 pages..... $3.00

Presents a study of rate-regulatory commissions in distributing the cost burden among different classes of subscribers and various classifications of service, with a background of the relevant court decisions. The book interests managers, executives and attorneys.

• SIGNALS OF SPEECH IN ELECTRICAL COMMUNICATION, by John Mills (1934); 281 pages $2.00

Sixteen short chapters, written in a clear, semi-technical manner and free from mathematics and diagrams, the book presents in an understandable way the principles of electrical communication, including telephone repeaters, multi-channel transmissions systems, and trans-oceanic communication. Sound pictures, broadcasting, television, and stereophonic reproduction are also explained. The non-technical, as well as the technical person, will really enjoy this volume because of its readability and understandable information.

• TELEPHONE THEORY AND PRACTICE, by Kempster B. Miller (1933); 1414 pages..$15.00

A set of three volumes, "Theory and Elements" (1930, 468 pages, $5); "Manual Switching and Substation Equipment" (1933, 439 pages, $5); and "Automatic Switching and Auxiliary Equipment" (1933, 494 pages, $5). Volumes may be purchased separately or as a set. This series replaces "American Telephone Practice" by the same author, published early in the century. The set comprises an excellent source of accurate information of entire subject of telephony.

• TRANSMISSION NETWORKS AND WAVE FILTERS, by T. E. Shea (1929); 470 pages..$6.50

A specialized book which deals with principles of transmission networks, electric wave filters, and composition of transient waves. It is intended for student engineers or graduate engineers.

• TELEPHONE CIRCUIT DIAGRAMS, by John M. Heath (1924); 279 pages..... $2.50

This handbook of pocket size has about 70 circuit diagrams with explanations of their working. The circuits begin with those used in the smallest battery exchange and are arranged progressively to take in circuits found in the large common battery offices. There are 28 diagrams relating to local battery equipment and 42 relating to the common battery equipment.

• BEGINNINGS OF TELEPHONY, by F. L. Rhodes (1929); 261 pages..... $4.00

Historical in nature, this book gives descriptions and details of problems encountered in development of telephone apparatus and equipment, such as microphone transmitter, overhead wire plant, cable, underground wires, loaded lines, telephone switchboard, station apparatus, the phantom circuit, and long distance lines.

• TELEPHONE COMMUNICATION SYSTEMS, by R. G. Kloeffler (1926); 284 pages..$4.00

An excellent book for obtaining a clear idea of the principles and operation of the apparatus and equipment of telephone systems. It deals with both the magneto and common battery systems, and also the step-by-step and panel systems. Only typical pieces of apparatus and circuits are given. Circuits have been standardized and partial circuits are shown before treating the more complicated complete ones. The arrangement of apparatus is identical in every case.

Designed for electrical engineering students in short college courses in telephony, it gives telephone worker general information outside the particular phase of his own work. Beginners in telephone work will find the book very useful.

• TELEPHONE COMMUNICATION, by C. A. Wright & A. F. Puchstein (1925); 515 pages.$5.00

Discusses practically every phase of telephone communication except machine-switching. Students, engineers, wire chiefs and plant men will find much of interest in the book despite the mathematical explanations necessarily a part of the proper presentation of the elements of transmission principles.

•STORAGE BATTERIES, by George W. Vinal (1924); 402 pages..... $4.50

The physical and chemical facts and theories about storage batteries are summarized and their various applications described in this book. Emphasis is laid on the scientific principles of storage batteries without permitting the text to become too technical. The physical, and chemical properties of the materials used in batteries are discussed as they relate to battery performance, and a general description of manufacturing methods given. Especial attention is directed to the electrolyte and the role it plays.

•TELEPHONY, INCLUDING AUTOMATIC SWITCHING, by Arthur Bessey Smith (1924); 450 pages $2.50

This book, of pocket size, was written with the idea of presenting an introduction to telephony. More than one-third of it is given over to local battery equipment and operation, and the greater part of the balance is devoted to automatic switching and equipment. The reader will obtain an excellent idea of substation and exchange equipment. Beginners will find much valuable information in the book.

• PRINCIPLES AND PRACTICE OF TELEPHONY, by Jay G. Mitchell (1924); five volumes, 1,436 pages $12.00

This set of books was written primarily for the telephone man who desires to obtain a broader knowledge of the basic principles of telephony through home study. The five volumes bear these self-explanatory titles: Principles and Apparatus, 251 pages; Circuit Elements and Power Plants, 300 pages; Toll Equipment, Traffic and Trunking, 290 pages; Circuit Refinements and Mechanical Switching, 329 pages; and Mechanical-Manual Switching, 265 pages.

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State Telephone Conventions in Southern States

LAST MONTH annual telephone conventions were held in four southern states — Georgia, North Carolina, South Carolina and Virginia, the report of the convention in the last-mentioned state having been published in TELEPHONY of last week. The convention of the Georgia Telephone Association was held at Atlanta, November 11 and 12; that of the North Carolina Independent Telephone Association at Wilson, November 4 and 5; and the meeting of the South Carolina Independent Telephone Association, at Rock Hill, November 8 and 9.

W. M. NEW, of Thomaston, president of the Thomaston Telephone Co., has retired as president of the Georgia Telephone Association.

All of these meetings were attended by representatives of the United States Independent Telephone Association. Executive Vice-President Louis Pitcher, of Chicago, addressed all three meetings on national affairs and the work of the national association. Secretary - Treasurer Chas. C. Deering, of Des Moines, Iowa, also attended all of the meetings and spoke on rural electrification. A. L. Geiger, Washington, D. C., general counsel of the United States association, addressed the conventions in the Carolinas on the Washington situation.

The Georgia Meeting

The Georgia convention, held at the Piedmont Hotel, in Atlanta, was well attended and keen interest was taken in the proceedings of the two-day meeting. The program included, in addition to reports of the officers, routine business and talks by representatives of the national association, addresses and papers on the following subjects:

"Problems Placed on the Telephone Industry," by C. A. Stair, Atlanta, vice-president, Southern Bell Telephone & Telegraph Co.

"The State Commission's Part in Utility Regulation," by Walter R. McDonald, Atlanta, commissioner, Georgia Public Service Commission.

"Travel Talk on the Holy Land and Egypt," by J. Prince Webster, of Atlanta, general counsel of the association.

"Rural Telephone Service in Georgia and Its Problems," by A. N. Seward, of Fitzgerald, division manager of the Southeastern Telephone Company.

W. M. New, of Thomaston, was succeeded as president of the Georgia association by A. N. Seward, of Fitzgerald. J. L. Mathews, of Statesboro, was succeeded by A. A. Fincher, of Canton, as first vice-president; Mr. Seward was succeeded as second vice-president by W. C. Echols, of Commerce; and J. Prince Webster, of Atlanta, was succeeded as secretary-treasurer by Homer J. Wright, of Dawson. The general counsel was not named.

The newly-constituted board of directors includes, in addition to president and the vice-president, the following:

W. M. New, Thomaston; J. L. Kirk, Moultrie; L. E. Winget, Sumter, S. C.; J. L. Mathews, Statesboro; J. W. Southall, Cairo; J. T. King, Milledgeville; and W. A. Jennings, Hawkinsville.

Special efforts will be made by the new officers to secure as active members of the association all of the small Independent operators in the state.

North Carolina Convention

The convention of the North Carolina Independent Telephone Association, held November 4 and 5 at Hotel Cherry, Wilson, had an attendance of approximately 130 men and women. The program included round table discussion on commercial, accounting, traffic and plant matters. These were conducted, respectively, by Robbins Tilden, of High Point; T. D. Wolfe, of Durham; J. K. Avent, of Tryon; and H. W. Dewey, of Elizabeth City.

In addition to talks by representatives of the national association, as mentioned previously and reports by officers and committee chairmen, an interesting address was made by F. H. Brant, landscape engineer, of the North Carolina State Highway Department, on "Highway Beautification."

Re-elected to office were President W. C. Darrow, Tarboro, assistant to executive vice - president, Carolina Telephone & Telegraph Co.; and Secretary-Treasurer E. H. Danner, Durham, general manager, Durham Telephone Co. James E. Blake, of Elizabeth City, was elected vice-president to succeed W. F. Harris, of Lexington.

The new board of directors includes the officers named and the following: L. A. Avent, of Tryon, manager of the Polk County Telephone Co.; L. D. Densmore, Charlottesville, Va.; H. W. Dewey, Elizabeth City, general manager, Norfolk-Carolina Telephone Co.; J. D. Morris, Roxboro, manager of the Morris Telephone Co. Mr. Morris was elected to fill the unexpired term of Geo. J.

PRESIDENT W. C. DARROW of the North Carolina association, was re-elected to office. He is assistant to the executive vice-president, Carolina Telephone & Telegraph Co., with headquarters in Tarboro.

As a Christmas Gift

Why not a Telephony Subscription?

A Year's subscription to TELEPHONY! A more practical Christmas gift for anyone engaged in telephone work could not be purchased for the small sum of $3.00 (or less for two subscriptions or more). This suggestion in years past has helped many telephone people and their families to solve their Christmas gift problems, bringing delight and profit to the recipients all through the year.

Success and advancement come to those who have prepared themselves for larger tasks and who have applied themselves to the tasks at hand with a bit more diligence than the average person. Through careful reading and study of the weekly issues of TELEPHONY any telephone employe can broaden his knowledge of all departments of the telephone business, thus increasing his value to his company and equipping himself for greater responsibilities and advancement in the future.

Why not this year present someone—even yourself—a year's subscription to TELEPHONY, with the Season's Greetings? Until December 20 special rates are being offered: Two new subscriptions, $5; three subscriptions, $6.75. The single subscription rate is $3.00 for fifty-two weekly issues.

The initial issue of your Gift subscription will be posted to reach the intended recipient by Christmas and a letter sent by first class mail will announce that the donor is presenting the subscription with the Season's Greetings.

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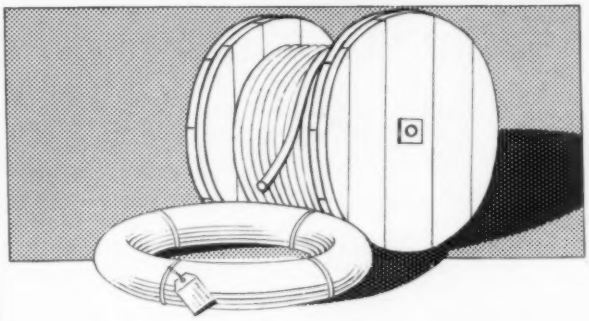

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Johnson, of Franklin, who resigned as director.

L. D. Densmore, of Charlottesville, Va., presided at the banquet, Thursday evening, November 5. The program included an address by T. A. Avera and entertainment furnished by radio station WGTM and was followed by dancing, in which many participated.

South Carolina Convention

About 150 persons attended the annual convention of the South Carolina Independent Telephone Association, held November 8 and 9 at the Andrew Jackson Hotel, in Rock Hill. One of the features of the program was an address by J. W. Wolfe, of Columbia, member of the South Carolina Public Service Commission.

L. E. Winget, of Sumter, presided over the traffic conference held in conjunction with the convention. He was assisted by Miss Lillian McLeod. C. B. Barksdale, of Greenwood, presided over the plant and commercial conference.

The state association's activities of the past year were reviewed by President F. S. Barnes, of Rock Hill, also president of the Rock Hill Telephone Co., and Secretary-Treasurer W. D. Wilkinson, of Sumter. The work of the national organization was discussed by the following executives of the United States association: Executive Vice-President Pitcher, General Counsel Geiger and Secretary-Treasurer Deering.

PRESIDENT F. S. BARNES of the South Carolina association, was re-elected for the ensuing year. He is also president of the Rock Hill (S. C.) Telephone Co.

President Barnes of the South Carolina association was re-elected to office, as was also Vice-President L. E. Winget, of Sumter, general manager of the Southern Continental Telephone Co. Mr. Winget and T. C. Thomasson, of the Lancaster Telephone Co., were appointed a committee to name a successor to Secretary-Treasurer Wilkinson, who resigned from office.

Mr. Thomasson and S. A. George, Lexington, manager of the Citizens Telephone Co., are new directors. The holdover members of the board, in addition to the president and vice-president, include:

C. B. Barksdale, Greenwood, secretary-treasurer of the Greenwood Telephone Co.; F. S. Barnes, Rock Hill, president, Rock Hill Telephone Co.; S. L. Bell, Chester, president, Chester Telephone Co.; O. W. Knight, Kershaw, secretary-treasurer, Kershaw Telephone Co.; J. W. Sproles, Greenwood, president, Greenwood Telephone Co.; A. G. Trenholm, Georgetown, general manager, Home Telephone Co., and L. E. Winget, Sumter, general manager, Southern Continental Telephone Co.

The holding of this series of telephone meetings in the southern states greatly stimulated interest of the various companies in association work.

FAHNESTOCK

Type 21-C Terminal Block and 7-B Connecting Block

THE LARGER ILLUSTRATION shows a new development in telegraph and telephone terminal blocks which we have been fortunate in furnishing to the Western Union Telegraph Company.

The larger block is coded 21-C. Its length is 5 inches and it is devised for 40 through connections. It possesses higher insulation than any block of its type and assures that each of the conductors will be free from contact with any other. Its design is such that soldering is exceptionally easy and so is the identification of any conductor terminating on it. An unusual feature of its design is that each lug can be removed or replaced without dismantling any other. Its many improvements and its low cost should make it attractive to Telephone Companies.

The smaller block, the No. 7-B Connecting Block, is, we believe, very familiar to the Telephone Companies. It is sturdy and compact and the many repeat orders we have had, testify to its practicability and general utility. Its small dimensions (2¼" x 1" x ¾") make it ideal as a junction block for telephone and Morse sets. It is provided with large screws so that even husky linemen won't damage them. It has a cover that can't come off and be forgotten or lost.

FAHNESTOCK ELECTRIC CO.

LONG ISLAND CITY, N. Y.

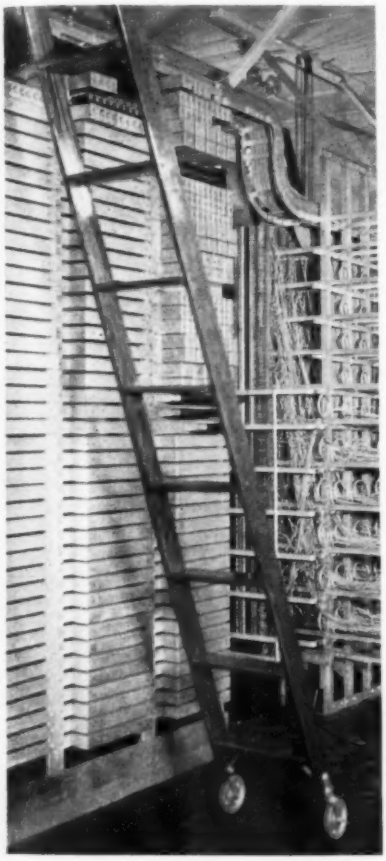
Plant Men Talk Things Over

"I Wonder Why" of a Telephone Engineer

By Ray Blain

"I Wonder Why" more telephone plant rooms are not equipped with permanently-installed rolling ladders?

They certainly prove a real convenience. The type of ladder referred to is shown in the illustration. It rolls along the floor on two rubber-tired wheels, each about 4 inches in diameter.



Two or More Modern Rolling Ladders, Which Do Not Require a Floor Track, Will Generally Prove a Desirable Investment for All Plant Rooms. They Are Quickly Located and Never Present a Hazard to Telephone Equipment.

The top of the ladder is attached to a grooved wheel which rolls on a suitable track suspended from the ceiling.

Some of the old-style rolling ladders required a double track fastened to the floor, which was convenient only to stumble over and most difficult to sweep around. The modern rolling ladders have been improved. Although they are easy to move and keep within desidered limits, they do not require a floor track.

The use of a portable step ladder in a telephone plant room is anything but desirable; it is seldom located where it should be when required. This type of ladder is often bumped into or falls onto protectors and may cause serious damage to expensive equipment.

The modern rolling ladders present a pleasing appearance and insure safety to workmen. They are always quickly located when needed in a hurry and never damage equipment. In this day of stress upon efficiency one should not be required to institute a search for a ladder when a fuse blows. Two or more good rolling ladders will generally prove a desirable investment for all plant rooms not so equipped.

▼ ▼

Automatic Device for Calling Hard-of-Hearing

An automatic signal to summon people hard-of-hearing to the telephone has been perfected by Alvin L. Reed, employed by the Lincoln Telephone & Telegraph Co. at Nebraska City, Neb. A partially-deaf banker at Talmage complained of missing telephone calls, which set Mr. Reed to work.

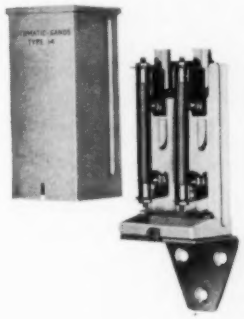
The device, built in Mr. Reed's spare time, is constructed around an ordinary furnace control rheostat. It is connected to an electric light circuit and the telephone line. When the operator rings the telephone a relay is thrown, sending electrical energy into a coil around the rheostat. Heat is generated in the coil until it expands enough to break the circuit.

Meanwhile a shrill buzzer is clamoring and a red light (taken from a Christmas tree string) is glowing. The time the two will operate is governed by setting the rheostat. Mr. Reed figures the device should be fixed at five degrees above room temperature for best results.

A graduate of the University of Nebraska, RCA radio institute and Cook electrical school, Mr. Reed also has perfected burglar alarms for banks, store buildings and farm henhouses. Several of these devices now are in use in the York vicinity, where Mr. Reed was born. He is particularly interested in the chicken house protector, as few farmers now have this type of alarm and losses in pilfered poultry run high every year. He has been with the telephone company 13 years.

SANDS

THE TYPE 14 SUB-STATION PROTECTOR



An enclosed weatherproof substation protector, easily accessible and ruggedly built for either indoor or outdoor use. Mounting bracket is reversible, permitting exposed or concealed mounting, as desired. Regularly equipped with two 5-ampere fiber-enclosed fuses and two Type 2105 discharge blocks. Write for information on this and other Sands protective devices.

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Commission and Court Activities

Voluntary Reduction in Mississippi Toll Rates

A $20,000 voluntary reduction in intrastate toll rates of the Southern Bell Telephone & Telegraph Co. was approved November 2 by the Mississippi Railroad Commission, effective December 1. The reductions bring the intrastate charges in line with those of other states served by the company.

Under the order, station-to-station day calls, beginning at a distance of 72 miles, are reduced from five to 25 cents to some points, with corresponding changes in person-to-person calls.

In two previous orders, which followed voluntary action of the telephone company, the commission approved reductions in exchange rates at some points, amended handset charges and altered assessments for moving telephone sets. The savings approximated $40,000 annually.

Voluntary reductions followed court suit by a previous commission to reduce rates around 16 per cent, which was dismissed by the court.

Approval of the lower rates was announced by Chairman Homer Casteel of Canton, Commissioner Dillard Brown of Tupelo and Commissioner Gillis Cato of Hazlehurst.

▼ ▼

Rural Electrification and Ground Lines in Nebraska

In his monthly bulletin to the members of the Nebraska Telephone Association, Secretary George M. Kloidy expresses gratification over the recent order of the state railway commission which sustains his position that the owner of electric power lines is legally liable for damages which may be caused to lines of a prior occupant utility on a public highway, either by inductive interferences or otherwise, when the electric line becomes a junior occupant of the highway with its services. In Nebraska there is a statutory provision to that effect.

The commission, he says, is not in a position to, nor does it desire, to enter into the managerial field and assume the management of telephone companies. The decision of the commission still leaves it for the management of each telephone company to decide what to do in the situation grown acute in Nebraska by reason of the widespread construction of rural electrification lines, stimulated by the spending of government money in the amount of five or six millions to that end.

Mr. Kloidy has decided opinions on the matter. He says that it is sometimes advisable for the driver of a motor vehicle to yield the right of way in order to avoid an entanglement that might prove more or less disastrous. He thinks a similar situation has been brought about in the matter of metallicizing grounded telephone lines. He adds:

"Should the metallicizing of grounded telephone lines by the power line owner create a situation which would make it impossible for the telephone company to obtain rates adequate to cover the additional cost of operation, it is my opinion, that in such an instance, without relinquishing any of the legal rights, it would become more practical for the telephone company to do its own metallicizing of the grounded lines, if by so doing it could obtain rates adequate to cover the additional cost of money because of the additional investment of the cost of operating the additional plant."

In an interview printed in the daily press, Mr. Kloidy suggested that subscribers to whom this type of service is the only one available, should inform themselves as to the effect of building rural electric lines in their localities upon their telephone service.

"In numerous localities in the state," says he, "adequate and satisfactory service is rendered over grounded lines; that is, one wire and the ground forming the circuit. By using this type of construction not only the original cost but also the maintenance and depreciation expenses are kept down to the advantage of the subscriber because of the lower cost of service.

"Power lines, using the ground as one side of the circuit, are now being constructed in rural areas; and when such lines come into parallel with existing grounded telephone lines, the electrical interference therefrom is very likely to disrupt communication service over the one-wire telephone lines, and it may become necessary to add another wire; or, in other words, metallicize the line and thus free it from the ground in order to restore service. This means an additional investment and additional cost of operation.

If the grounded telephone lines are metallicized at the expense of the power-line owner, it still leaves the telephone company with increased costs of

maintenance and depreciation, and this may be sufficient to imperil financial solvency; especially is this true where many telephone companies are not earning those costs.

Electric service and telephone service are both needed in the modern farm home. Both add greatly to the convenience and efficiency of farm life. Although there may be no doubt as to the metallic service being well worth its additional costs because power line interference and crosstalk are banished, subscribers to the cheaper grounded service over one-wire lines should be thoroughly informed as to what the building of power lines in their locality means to their service and its added cost."

▼ ▼

Request for Higher Rates Renewed in Oklahoma

In an application filed November 6 with the Oklahoma Corporation Commission, the Southwestern Bell Telephone Co. renewed its efforts to secure rate increases in 14 Oklahoma cities. Attorneys for the company coupled an application for an early rate hearing for the 14 cities with a motion to dismiss the commission's cross-petition to eliminate the 15-cent monthly charge for handset telephones.

Referring to the cross-petition prepared by J. B. A. Robertson, attorney for the commission, the motion declared there is no legal authority for such action by a commission employe and added that the cross-petition makes the commission "an adversary party."

Identical pleadings filed in connection with the rate increase application for the 14 cities contained claims that in seven cities the company operated at a loss the first six months of this year.

In Chickasha, the company reported a loss of $1,334. Typical of the rate increases asked was a boost from $2 a month for one-party residence telephones at Chickasha to $2.60.

▼ ▼

Application Filed to Reduce Handset Charge

The Platte Valley Telephone Corp. of Scottsbluff, Neb., has made application to the Nebraska State Railway Commission to establish a 15-cent differential rate on handsets, to run for 36 months, at which time there will be no additional charge for handsets, if the application is granted.

The rate now authorized is 50 cents per month for all handset type telephones, with a decrease to 25 cents per month after three years. If approved, this change will result in a saving of 35 cents per month to the newer subscribers who have handsets, and 25 cents per month on the bill for any subscriber who has a handset, regardless of the length of time he might have had it. The effective date sought is January 1, 1938.

▼ ▼

Handset Rate Now Ten Cents for 18 Months

The Nebraska State Railway Commission has issued a consent order changing rates charged by the Northwestern Bell Telephone Co. for handset telephone service. For several years the company has had authority to charge 15 cents a month for 36 months, after which the handset is free. Under the new order a 10-cent rate will be in effect for 18 months.

This brings on the free list a large number of handsets now paying the 15-cent rate, and in order to prevent forcing out of use a large number of still serviceable sets the commission allowed the company to collect an installation of $1.00 where one station is involved, 50 cents where two are changed and 25 cents for each added station. The new order is expected to materially curtail revenues from this source.

▼ ▼

Handset Charge Reduced, Limited in South Dakota

Further investigation of the equipment charges for handset telephones of the Dakota Central Telephone Co. and the Northwestern Bell Telephone Co. by the South Dakota Board of Railroad Commissioners resulted in an order November 10 which further reduced the handset charges. The companies were directed to reduce the additional monthly charge of 15 cents for handsets to 10 cents and to collect such charge only 18 months, consecutively, instead of 36 months as formerly.

It was further ordered that a change-of-instrument charge be applied where a handset is substituted for a desk or wall set at the request of the subscribers, "such charge to be one dollar for the first handset, 50 cents per instrument for the next ten handsets, and 25 cents per instrument for all additional handsets."

The Northwestern Bell company was directed to place the new handset rate into effect as of November 24, while the effective date for that of the Dakota Central company will be December 1.

This commission has from time to time made certain orders reducing the additional charge for handset instruments in South Dakota. In its recent order it held that it is proper that further reductions in such additional charge should be made as conditions warrant.

"On the other hand," stated the order, "we find that under existing con-

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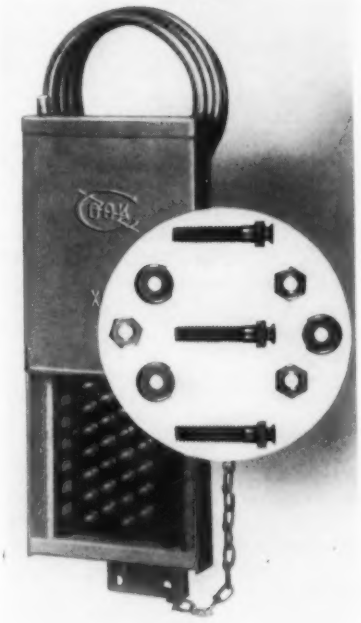

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Everdur is a non-corrosive metal of great strength, highly resistant to all atmospheric conditions—salt water, fog, sulphur, smoke, etc. It is 96% copper, 3% silicon, 1% manganese.

Everdur is used for the square head studs, nuts and washers in the XB Terminal.

COOK ELECTRIC CO.
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Always Specify
COOK
PROTECTION

Answers to Traffic Questions on Page 12

1. This is a matter of judgment. On long reaches it is advisable to release the cord you are holding.
2. If neither the calling or called party agrees to pay for the call on the first use of the toll circuit, the call is subject to a report charge.
3. Reach the TTC operator and say "Ticket." When the TTC operator says "Ready" say "Operator (number of proper point-to-point pos.) at (OTC)", and then pass the details of the call as they appear on the ticket. In passing the name of the calling place, add the name of the state, if necessary for identification. When the TTC TX says, "This is operator (no.)", say, "Right," and enter "passed to opr. (no.)-(time)" in the space for reports
4. If the subscriber in question has experienced difficulty on a call, give your chief operator complete details in connection with the call. The chief operator should refer the case to her manager.
5. That depends upon the nature of the first report. When a subsequent attempt is made on the call at the specified time and another report is received it is passed to the calling party.

ditions some additional charge on this account should be continued. This is required to insure orderly progress in changing from other types of instruments to the handset, and to prevent a wholesale and wasteful replacement of other types of instruments by handsets."

It was found that the Northwestern Bell Telephone Co. does not, at the present time, apply the change-of-instrument charge ordinarily imposed in cases of the change from one type of instrument to another, in cases of the substitution of a handset for a desk or wall set. The commission held that such a charge should be made in cases where handsets are substituted for desk or wall sets at the request or order of the subscriber. This charge will operate in part to control any wholesale or wasteful substitution of handsets for usable desk or wall sets.

"The matter of a further reduction in the additional charge for handsets has been discussed by the commission with representatives of the company," stated the order, "and it has been agreed between the company and the commission that revised tariffs be filed by the company."

▼ ▼

Pennsylvania Bell to Drop Handset Charge

An order handed down November 5 by the Pennsylvania Public Utility Commission, discontinuing the 15-cent extra monthly charge made by the Bell Telephone Co. of Pennsylvania for handset telephones, will reduce the company's revenues about $300,000 yearly it is estimated. The charge will be dropped December 8, on which date a tariff supplement is to be filed.

At present the 15-cent monthly charge is collected for 12 consecutive months from the user, after which it is discontinued. Under the new order the charge will be dropped for all subscribers and on the effective date of the order, 178,500 handset users will benefit.

The handset reduction order is a part of the general inquiry into operations of the Bell company, instituted on October 27. The inquiry includes the reasonableness of rates and is the most sweeping yet undertaken by the commission.

It was pointed out that an immediate result of the order will be to make the handset standard equipment. The statement announcing the action said:

"The commission is confident that its order will result in the complete elimination of the extra handset instrument charge from the entire telephone set-up in Pennsylvania. It believes the various Independent telephone companies in the state will eliminate the extra charge voluntarily.

The Pennsylvania Telephone Corp., largest Independent telephone company in the state, acting in harmony with the commission's program in this respect, on October 28, 1937, agreed to the complete elimination of these charges effective on all billings on and after January 1, 1938.

The original extra monthly charge in Pennsylvania for a handset instrument was 50 cents, started by the Bell company on March 1, 1927. This was reduced to 25 cents on March 1, 1928, but in neither case was there a time limit.

Later the company was ordered to discontinue the extra charge of 25 cents after a subscriber had paid it for two years. This order was effective on February 21, 1933.

On April 15, 1936, the extra charge was reduced to 15 cents but the two-year payment period retained. On March 1, 1937, the payment period was reduced to the present 12 months."

▼ ▼

Summary of Commission Rulings and Hearings

Federal Communication Commission, Washington, D. C.

November 10: Application filed with the telephone division by the Indiana

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Bell Telephone Co. requesting authority under section 221 (a) for a certificate that the proposed acquisition by the applicant of the property of the Dugger Mutual Telephone Co. in the state of Indiana will be of advantage to the persons to whom service is to be rendered and in the public interest.

On October 28 the Indiana Public Service Commission authorized the Indiana Bell company to purchase the Dugger Mutual company for $3,000.

November 10: Application filed with the telephone division by the Chesapeake & Potomac Telephone Co. of Virginia requesting authority to supplement existing facilities between Abington, Va., and Bristol, Tenn.

Illinois Commerce Commission

November 22: Hearings in Chicago on complaint of William T. Dickerman against the Illinois Bell Telephone Co. as to charges, rates and time limitations for use of telephone in Chicago.

November 24: Hearings in Chicago on complaint of Edward M. Flavin against the Illinois Bell Telephone Co. as to certain rules of the company covering telephone rates in Chicago.

Michigan Public Utilities Commission

November 5: Order issued requiring applicants for articles of incorporation for gas, telephone or electric companies to seek its approval before filing with the corporation and securities commission.

Previously, applications have gone directly to the corporations commission. An act of 1919 gave the public utilities commission power to review, which has never been exercised, Chairman Paul H. Todd explained.

The order also requires that companies or subsidiaries seeking amendments to franchises must first obtain the public utilities commission's approval.

Mississippi Railroad Commission

November 2: Approval granted voluntary reduction in intrastate toll rates of the Southern Bell Telephone & Telegraph Co., totaling $20,000, effective December 1.

New York Public Service Commission

November 17: The Ontario Telephone Co., Inc., filed revised tariff schedule which waives service-connection charges from December 1, 1937, to January 31, 1938, inclusive, during which period the company will promote a campaign to secure additional telephone stations. The company furnishes telephone service in the central office districts of Clifton Springs and Phelps in Ontario County. At the present time it has about 750 stations whereas in 1929 it had slightly more than 1,000 stations. The commission permitted the waiver of service-connection charges to become effective for the months of December and January.

Ohio Public Utilities Commission

November 15: Secretary of the commission certified to the mayor of Morral and to the Ohio Associated Telephone Co. the report of the commission's engineers on the application of the company for an increase in rates at Morral.

November 16: Pleading there is no intention to change the existing rates and that the value of the property is not less than $71,173.32, the Ohio Associated Telephone Co. petitioned for authority to purchase all of the property of the Spencerville Telephone Co. for not less than the sum stated, payable in bonds or preferred stock as may be hereafter elected by the purchaser.

The value of the property will be checked by the commission's engineers.

November 18: Joint application filed by the Ohio Associated Telephone Co. to purchase, and the Lower Salem Farmers' Telephone Co. to sell all of the property and business of the latter for such capitalizable consideration as the commission may find, but not less than $2,342.50.

The property will be appraised by the commission's engineers.

November 18: Preliminary order adopted authorizing the newly-organized Chesapeake Telephone Co. to purchase the property of the Chesapeake & Lawrence County Telephone Co. recently sold at judicial sale.

November 18: The Ohio Associated Telephone Co. applied to the commission for authority to revise its rates at Mineral City as follows:

Business independent, from $2.75 to $3.50; business four-party, $2.25 to $2.75; business rural, $2.00 to $2.50; residence independent $2.00 to $2.50; residence four-party, $1.50 to $2.00 and residence rural $1.50 to $2.00.

Oklahoma Corporation Commission

November 4: Permission granted the Interstate Public Utilities Corp. to sell its exchange at Hardesty, to Willard Cobb and its Tyrone exchange to Ralph W. Winsted. Both exchanges are located in Texas County.

November 4: Order issued authorizing the transfer of the telephone exchange at Cyril, Caddo County, from Reece Petillo to C. E. Devin, doing business as the Apache Telephone Co.

November 6: Application filed by Southwestern Bell Telephone Co. asking for an early rate hearing on its request for rate increases in 14 cities and motion filed to dismiss the commission's cross-petition to eliminate the 15-cent monthly charge for handset telephones.

South Carolina Public Service Commission

November 4: A group of Due West citizens appeared before the commission to oppose the plan of the Due West Telephone Co. to discontinue free service between Due West and Abbeville. Free service has been supplied for several years, but the company now contends it cannot continue it in view of the necessity of considerable work to the line.

Abbeville county legislators and others, including Dr. R. C. Grier, president of Erskine college, attended the hearing.

Wisconsin Public Service Commission

November 18: Wisconsin Telephone Co. ordered to change its rate to two groups of rural customers within six miles of its Jefferson exchange. The new rate is $1.85 per month and is an increase of 10 cents per month for one group and a decrease of 15 cents for the other. The change was ordered following a rehearing on a previous order requiring the company to eliminate the difference in rates between the two groups.

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Illinois Bell Rates Ordered Cut $2,650,000

THE ILLINOIS Commerce Commission on November 23 entered an order reducing rates of the Illinois Bell Telephone Co. $2,650,000 a year.

The commission at the same time refused the company's plea that it be allowed to pass on to the telephone-user the 3 per cent state sales tax. This would have added $2,265,000 a year to telephone bills. Altogether, the cut in telephone charges in Chicago and downstate Illinois, with the sales tax included, will amount to $5,715,000 a year, according to Commission Chairman James M. Slattery.

The reductions are summarized as follows:

Residential measured service in Chicago, cut	$1,175,000
Abolishment of monthly charge on cradle handsets in the state	800,000
Reduction in toll charges in metropolitan Chicago district	280,000
Exchange rates in major Illinois cities, cut	157,000
Mileage charges on tie lines in Chicago	65,000
Extension of 5-cent toll zone adjoining Chicago	60,000
Cut in rural rates in 169 communities	55,000
Miscellaneous reductions	54,000
	$2,646,000

The new rates are effective January 1, 1938.

The decision followed a long investigation of the telephone situation in the state and city of Chicago. The company had sought an increase in rates to cover the 3 per cent paid under the utilities sales tax law. The commission turned down this request and at the same time found that the rates should be pruned down so as to make the direct saving of $2,650,000 a year in telephone bills.

In his statement summarizing the results of the commission's action, Chairman Slattery pointed out three principal changes in Chicago rates and service as follows:

"Customers subscribing to two-party residential measured rate service, and most customers subscribing to one-party residential measured rate service, will receive savings in their monthly bills.

The 15-cent monthly charge for handsets, or cradle type telephones, is eliminated.

Provision is made for establishment of a new metropolitan service, available to both residential and business subscribers, under which calls to the suburbs will be counted in much the same manner as local calls in figuring customers' monthly bills, thereby making substantial savings possible to subscribers preferring this service."

Four-party lines are virtually abolished by the order. Present four-party coin-box users are enabled to obtain the better two-party measured service, as well as the new cradle telephone, for the same or lower monthly bills than they are now paying.

Chicago and suburban telephone-users are the chief beneficiaries of the order as their savings will be $2,250,000 annually out of the total $2,650,000 savings to users estimated by the commission.

Downstate exchange rates were ordered reduced $157,000 a year, as follows:

Peoria, $38,348; Rockford, $23,877; Rock Island, Moline, East Moline and Milan, $39,501; Champaign and Urbana, $11,253; Joliet, Lockport and Rockdale, $8,172; Aurora, $7,470; Alton, $14,160; Quincy, $12,669, and Vandalia, $1,653.

The order contemplates a saving of $100,000 to Chicago subscribers and $180,000 to suburban subscribers annually through readjustment of rates for calls across town limits. The order would create a new metropolitan service to provide a reduction in the charge for station-to-station calls which now cost 15 cents or less, for residence subscribers who agree to pay 25 cents a month above their regular rate, or for business subscribers who will pay 50 cents a month.

Chicago subscribers to this metropolitan service will have each 5-cent unit of their suburban calls count the same as a local call, thus helping to make up the monthly minimum, or taking advantage of the reduction for excess calls.

For suburban subscribers who take the metropolitan service, local calls will remain unlimited, while the calls to Chicago will be billed as a separate item, but at reduced rates per unit. The effect will be that calls which now cost 5 cents, 10 cents, or 15 cents, will cost suburbanites 4 cents, 8 cents, or 12 cents, respectively.

Several more Chicago suburbs are put on a 5-cent rate with certain Chicago offices in the commission's order. Blue Island will be connected with the Beverly and Pullman exchanges; Evergreen Park with the Prospect exchange; Niles with the Kildare exchange; River Grove with the Kildare and Newcastle exchanges; Tessville (Lincolnwood) with the Rogers Park, Irving, and Kildare exchanges; and Cicero with the Austin exchange.

A further large saving to subscribers will be made in the elimination of the 15-cent-a-month charge for handset or cradle telephones. This charge is now made for the first two years of service. The saving for the state on this item is figured at $800,000 by the commission, $600,000 of it in Chicago alone.

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Prices in the Metal Markets

New York, N. Y., November 22: Copper, steady; electrolytic spot and future, 11c; export, 9.77@9.82c. Tin—barely steady; spot nearby and future, $41. Lead—Steady; spot New York, 5@5.05c; East St. Louis, 4.85c. Zinc—easy; East St. Louis spot and future, 5.50c. Iron—No. 2, f.o.b. eastern Pennsylvania, $25; Buffalo, $24; Ala., $20.

Obituaries of Telephone Men

FRANCIS A. BOWDLE, registered public accountant with offices in Wheaton, Ill., and Independent pioneer telephone man well known in the field, passed away at his home in Wheaton November 10, at the age of 64. Mr. Bowdle suffered a slight stroke during the recent national convention. He had been in telephone work for 39 years.

FRANCIS A. BOWDLE, registered public accountant with offices in Wheaton, Ill., and a pioneer telephone man in the Independent field, passed away November 10 at his home in Wheaton. He was 64 years old. This picture shows Mr. Bowdle as he appeared about 20 years ago.

Mr. Bowdle was born on a farm in Piatt County, Illinois, May 31, 1873. Following a grade school education he attended the Bement High School, the Browns Business College at Decatur, and took courses at the Armour Institute and the La Salle Extension University in Chicago.

After some experience in the grain business in the accounting department of the Barrett Mfg. Co. and with Nelson Morris & Co. of Chicago, Mr. Bowdle actively entered the telephone business in 1900 as manager of the Union Telephone Co. at Chatham, Ill. Under his management, the company increased the number of its subscribers many times. In 1910 he became secretary and general manager of the Cerro Gordo Telephone Co. at Cerro Gordo, Ill. He was mainly responsible for the company securing an increase in its rates, after which the plant was rebuilt and made an underground system.

Mr. Bowdle originated the Bowdle system of accounting for Class B, C and D companies, continuing in accounting work after moving to Wheaton. His many years of actual experience in the operation of telephone properties helped him to understand the needs of telephone men in their accounting problems.

In the early days of telephony—and competition—Mr. Bowdle represented his company at Cerro Gordo in fighting the Bell when it built paralleling telephone lines and the Independent company was successful in maintaining occupancy of the territory.

Mr. Bowdle was largely responsible for the organization of the Central Illinois Telephone Association and regularly attended district and state meetings of Independent associations. He was a charter member of the Independent Pioneer Telephone Association of the United States. He was a member of the Masonic and several other fraternal orders.

Surviving are his widow, Mrs. Mayme M. Bowdle; three sons—William H. of Chicago, Donald O. of Wheaton and Paul H. of Boston, Mass.,—and a sister, Mrs. L. W. Wise of Watseka, Ill. Interment was at Bement, Ill.

FRED LESTER ARMSTRONG, manager of the Greenleaf Telephone Co., Greenleaf, Kans., for the past 10 years, died November 9 after an illness of more than a year. He was 56 years old.

Mr. Armstrong was born October 7, 1881, at Glen Elder, Kans. His parents moved to Greenleaf when he was three weeks old. He received his education in the Greenleaf schools and was a graduate of Bradley Polytech of Peoria, Ill. He was in business for a few years in Weston, Mo., and Salina, Kans.

For more than 13 years Mr. Armstrong has served on the city council at Greenleaf and has been chief of the volunteer fire department of the town for several years. He was recognized as a leader in musical circles and civic improvement. He was a member of Trinity Lutheran Church.

Mr. Armstrong is survived by his widow, one daughter, Mrs. W. H. Harrison, his mother, Mrs. Martha Armstrong, and two brothers, T. B. Armstrong and Harold Lee Armstrong, both of Kansas City.

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"Telephony's" Engineering Data

By B. C. BURDEN

Index, General.
Nov. 27, 1937.
No. 43-A, Page 107.

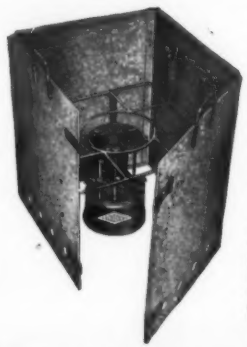
Theory and Practice of the Magneto Telephone Exchange—(Ctd.)

Measure out from two of the cornerstones (found at most half-section and section corners) to the point at which it is desired to place the poles. Set up the level at a point directly over one of the points and, after the preliminary leveling operation, sight through to a range rod placed on the next point.

The plumb bob attached to the exact center of the base plate should be used to center the instrument over one of the points. After getting the distant rod exactly in line, lock the swivel so that the telescope cannot turn, and signal to the rodman to move to the next pole location toward the instrument. Again sight in the rod. When the operation is complete, signal the rodman to stake the location. Proceed in this manner until all poles are staked.

The span lengths can either be determined by the rodman dragging a piece of wire of span length with a small weight on the free end, or by laying off the span lengths prior to sighting for the exact pole location.

In order to guard against errors due to the instrument shifting its position, it is often advisable to leave a rod in place at the distant point so that any shifting would be readily apparent. Due to trees, high grass or intervening objects, it is sometimes impossible to see from one point to another, even though the country is fairly



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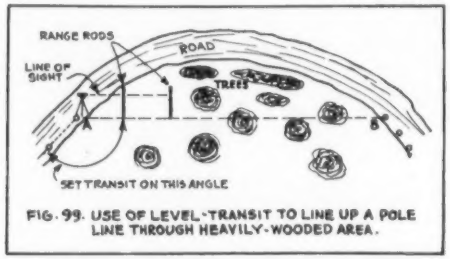

FIG. 99. USE OF LEVEL-TRANSIT TO LINE UP A POLE LINE THROUGH HEAVILY-WOODED AREA.

flat. In this case the pole locations can be laid out along the side of the road and later transferred over to the correct location by means of a tape.

Where it is necessary to line up pole leads in rolling or hilly country and where the beginning and end of the line cannot be seen from either end, a slightly different procedure must be used:

The instrument is set up on a high intermediate point that is visible from both the locations which are to be used in establishing the pole lead. Make the preliminary leveling adjustment and then change the telescope so that it can be used as a transit. Sight in one of the rods located, say, at point A. Lock the swivel and reverse the telescope in the "Y's" and take a sight on the rod at station B.

Note whether the sight falls to the right or left of station B. If it does, move the entire instrument over so as to be in line between the two points. Again level the instrument and proceed in the same manner, shifting the instrument until both stations can be seen from the same location. This operation is referred to as "balancing in."

After the instrument is found to be in line, stake out the line in the same manner as outlined for level country, except in this instance the telescope may be moved on its horizontal axis and used in a manner similar to a transit.

Line Between Two Points Not Seen from Intermediate Location

It is frequently desired to locate a pole line between two points that are not visible from each other and where it is impossible to locate the instrument at a point from which they would be visible. In such a case obtain a

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topographic map of the locality from the local surveyor and locate, on the map, the two points at opposite ends of the section as accurately as possible. Lay out accurately with a protractor the angle that the two pole lines make with each other.

Set up the level at one of the points and set the telescope at the desired angle by means of the circular scale which is calibrated in degrees. (Note: Inasmuch as the convertible level is not intended for a highly accurate angular measurement, it is not equipped with a vernier scale; therefore, great care should be taken in setting it to the desired angle as a large error would be introduced by a small error in the angular setting.)

After the angle is laid out, lock the swivel and send two rodmen ahead several hundred feet and sight them in. Establish two points in a straight line, then move the level to one of the points established and keep on extend-

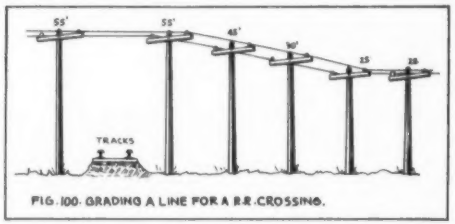

FIG. 100. GRADING A LINE FOR A R.R. CROSSING.

ing points until the opposite end of the cutoff is reached. If the line extended does not come out at exactly the right location, it will be necessary to compute the error and then re-run the line making a slight correction in the angle.

If the cutoff is quite long it might pay to obtain the services of a professional surveyor with a regular transit. However, for the type of cutoff usually encountered in pole line construction, the convertible level will be found very satisfactory. Fig. 99 illustrates this method of locating a pole lead.

In staking out pole lines the engineer should be careful to specify poles of adequate height to clear highway, private drives, railroads (Fig. 100), etc. Where high poles must be provided at road crossings and other points to provide adequate clearance, the poles on each side of the crossing pole should be properly graded so that there is no abrupt change.

IN THE NATION'S CAPITAL

(*Continued from page* 16)

CROP CONTROL: Some kind of a measure will emerge but what it will be is a pure gamble. Chances slightly favor Secretary Wallace's compulsory production restriction, amended to apply to specific crops. But there is a formidable opposition bloc all set to do battle for a "voluntary compliance" amendment.

SEVEN TVA'S: When the administration decides definitely whether it really wants seven TVA's to construct and operate definite projects, or merely a series of regional study boards, it will find that Congress certainly will not approve seven TVA's but may be disposed to pass a face-saving compromise in the form of seven "planning agencies." It is very doubtful if the left wing would tolerate such innocuous legislation. This may even result in an open breach between Senator Norris and the administration.

Now, for the regular session, here is the present outlook for the "big 4":

WAGES - AND - HOURS: Fifty-fifty chance for no legislation at all. The original Black-Connery bill is a dead issue. If any bill is enacted, it will be a much milder bill grudgingly approved by the labor groups. The new Connery bill to do away with a national board and simply specify general statutory limitations may be the rallying point for the final compromise.

The limitations in such event will probably be in the neighborhood of the 40-40 provision okayed by the Senate last year (not less than 40 cents an hour and not more than 40 hours a week). The South would demand and probably get some differential as the price for stalling off another filibuster. In general, every day's delay in getting a bill organized, and every additional point of recession in business activity, will increase the likelihood that no bill whatever will result.

ADMINISTRATIVE REORGANIZATION: The President will get a sorry fraction of a loaf on this. He will get his six new secretaries, of course. But executive control of the so-called independent agencies (FPC, FCC, SEC, ICC, etc.) is already dead and buried, although the funeral has not been officially recorded. Congress will probably buck on surrendering the independence of the Comptroller General (General Accounting Office), but may trade with the administration by approving the suggested reorganization of the Civil Service. A long and bitter fight is ahead for the entire subject but a bill along the lines indicated will finally emerge.

UTILITY BILLS: Somewhere well on in the second half of the regular session Congress will pass the following (subject to further change, please remember): The Lea bill to have the FPC regulate interstate gas; (2) the Minton "prudent investment" bill to restrict Federal courts in granting injunctions in rate cases; (3) a resolution (by either Senate or House, or jointly) to investigate radio broadcasting industry and probably the FCC.

SPEAKING about wages-and-hours brings up the sore subject of labor relations. Recently, it seems that the utilities have been selected by the rival union groups and the NLRB as the final battleground for settling three important points that have been troubling the New Deal's labor regulation program, as enacted in the Wagner Act:

(1) Whether the NLRB can shove aside bargaining contracts made by an employer with either a CIO or AFL union; (2) whether local utility operations are "interstate commerce" within the meaning of the Wagner Act; (3) whether a closed shop contract under the Wagner Act means that employes have to join up and pay dues or lose their jobs.

Strangely enough, tests on all three points were raised recently in connection with utilities operating in New York City. Covering the last point first, six individual employes of the Brooklyn-Manhattan Transit Co. have appealed to higher New York state courts from a lower court order requiring them to join a CIO union which has a closed shop contract with the transit company. These employes do not deny the exclusive bargaining authority of the CIO union, but assert that no labor law should compel them as individuals to pay dues or lose their jobs.

The action of the NLRB in setting aside the contract between the Consolidated Edison Co. and an AFL union was adequately covered in the press and needs no further comment here, except to say that there is increasing protest in Congress against the continual one-sided (pro CIO) interference by NLRB with closed shop contracts. The incident certainly scared away, for the present, whatever doves of peace were hovering over the AFL-CIO issue.

ANOTHER POINT in the NLRB decision in the Consolidated Edison case is perhaps of more immediate concern to telephone companies. The Consolidated Edison, it will be

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MacGillis & Gibbs Company, Milwaukee, Wis.—Northern White and Western Red Cedar Poles. Plain or butt-treated. Immediate quotations on request.

T. M. Partridge Lumber Co., Minneapolis, Minn.—Northern White—Western Red Cedar Poles. Plain or butt-treated.

H. Sigalet & Company, Ltd., Lumby, B. C., Canada—Western Red Cedar Poles. Plain or butt-treated.

Valentine Clark Corporation, 2516 Doswell Ave., St. Paul, Minn.—Finished Cedar Poles. Plain or butt-treated.

recalled by readers of this department, had raised the jurisdictional claim before the NLRB that it was operating entirely in intrastate commerce. The NLRB denied this on reasoning resembling that used in a similar controversy involving the Pacific Gas & Electric Co.

The New York utility presents a clearer-cut case, however, because the NLRB conceded that the physical utility operations were 100 per cent confined to New York state. Federal jurisdiction, therefore, rests entirely on the fact that utility power is used to supply all harbor, transportation, communication, and other facilities, interference with which would obstruct or paralyze the flow of interstate commerce.

The following passage from the NLRB opinion should be of interest to all types of utilities. After pointing out that the company's service was used in the operations of railroads, subways, airfield beacons and light houses, the gigantic New York harbor, the Holland Tunnel, and, of course, the telephone, telegraph and radio facilities of the city, the opinion stated:

> It thus becomes evident from all the above findings . . . that a labor dispute between the respondents and their employes interrupting the respondents' operations would seriously affect the flow of vast quantities of coal and gas oil, and quantities of copper, cable and other commodities, in interstate commerce; that a cessation of the flow of power from the respondents, such as would tend to accompany a labor dispute between the respondents and their employes, (a) would in a short time paralyze the operations of many of the instrumentalities of interstate and foreign commerce and communication in and around New York City, and thereby also paralyze the operations of most of the businesses situated in the area served by the respondents and engaged in shipping and receiving commodities in interstate and foreign commerce, and would curtail the United States mail service, including mail carried in interstate and foreign commerce, and (b) would directly cause the cessation or curtailment of the operations of the businesses served with power by the respondents and engaged in shipping and receiving commodities in interstate or foreign commerce.
>
> Expressed concisely, a labor dispute between the respondents and their employes interrupting the respondents' operations would not only affect the flow of the large quantities of coal and oil which they receive in interstate commerce, but might be substantially equivalent to the effect on interstate and foreign commerce and communication which would be caused by simultaneous labor disputes in the respondents' business and in all the businesses served by the respondents that are engaged in operating the instrumentalities of interstate and foreign commerce and communication and all the businesses engaged in shipping and receiving commodities in interstate or foreign commerce.

Is there any doubt that a similar line of reasoning would be applied to almost any local urban exchange telephone operation? The forthcoming appeal of this Consolidated Edison case promises a court test on this unprecedented definition of interstate commerce.

THIS WRITER is brash enough to say that there is one point upon which he agrees with FCC Chairman McNinch and Commissioner Payne whole-heartedly and without reservation. That is on the subject of the excessive tedious and exasperating commercial plugging that clutters up the radio air waves these days. Because of this community of interest this department recommends to the attention of the Anti-Ballyhoo wing of the FCC the era-shaking news of a recent experiment at Harvard University's psychological laboratory.

Seems that an instructor there (the name is Smith, in case you want to remember him in your prayers) has made himself into a human radio receiving set by filling one ear with salt water, inserting a bit of wire into the water, and strapping a second piece of wire to another part of his body. Says he can hear all the music perfectly but can't distinguish the spoken announcements. What a discovery! What a discovery!

Of course, the idea is only in its crude stage. It would be awkward running around that way, constantly wired for sound. And keeping the salt water in your ears would be quite a neat trick, if you could do it. But surely in this scientific day and age mechanical experts could improve on the bare rudiments so as to give us that long-awaited boon to humanity—the plugless radio. (No reflection on the power industry intended.)

SPEAKING of being wired for sound brings up another item of Washington gossip. Because there

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was a telephone angle to the recent petty scandal about the rigging of Secretary Ickes' office telephone, this correspondent dropped in to see an old friend over at the Interior Department to find out, if possible, who tapped whose telephone, and why.

Well, the old friend recalled that during the earlier days of the New Deal it was other officials whose telephones were tapped, and it was Secretary of the Interior Ickes who got the blame for it.

More recently, some higher-up in the newly-inaugurated housing division of the Interior Department complained of the same thing, with knowing scowls in the same direction of the big chief's office.

Secretary Ickes officially denied that any internal wire rigging had been done of recent months with his knowledge or approval; and then on top of that the local telephone company found out that the Secretary's own telephone was not only tapped but hooked up to a dictaphone recorder.

This much was all over the newspapers. What your correspondent was trying to find out was what kind of a tap-for-tap game was going on at the Interior Building. The old friend didn't have much to say about that but he did say something like this:

"Did you ever know what Cardinal Richelieu used to do when he felt that popular criticism was getting too hot for his safety in office?"

This writer had to admit ignorance of such details of French history during the reign of Louis the XIII.

"Well," said the old friend, "Cardinal Richelieu used to hire a gang of assassins to hide in ambush and fire at his carriage. Of course, they were warned to fire quite high so as to avoid any danger of injuring him. The effect of this apparent attempt at a despicable assassination always resulted in a revival of public sympathy for Richelieu."

Funny how these public servants are so irrelevant. You ask them about something that is happening today, and they get you all turned around on a tale from ancient history.

▼ ▼

Minnesota Convention to Be Held in Minneapolis

On January 25, 26 and 27 the Minnesota Telephone Association will hold its annual convention, the Radisson Hotel, Minneapolis, having been selected as headquarters for the meeting. J. C. Crowley, Jr., of St. Paul, is secretary.

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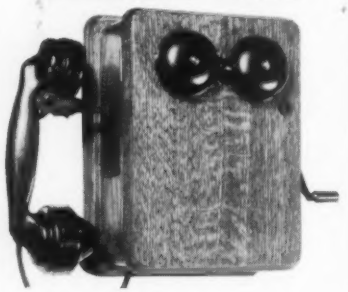

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MATHEMATICS FOR TELEPHONE ENGINEERS

(*Continued from page* 15)

Writing $n\pi = \theta$, $n = \theta/\pi$ and $(-1)^{\theta/\pi}$, operating on a vector, rotates it through an angle θ.

Thus if $\theta/\pi = 1/2$, $(-1)^{1/2} = \sqrt{-1}$ represents a rotation of $\pi/2$ radians or 90°, a right angle, as has been shown previously.

In Fig. 169 OA is a vector Z and OB is the vector $Z\theta$. $OC = Z \cos \theta$ and $CB = Z \sin \theta$. But CB is perpendicular to OA the axis of *reals* and parallel to the axis of *imaginaries* OY, and this is denoted by writing $CB = j Z \sin \theta$.

Now $OB + Z\theta = OC + CB$ (vectorially)

Therefore, $Z\theta = Z \cos \theta + j Z \sin \theta$.
$= Z(\cos \theta + j \sin \theta)$

This must be so for $\cos^2\theta + \sin^2\theta = 1$ and $\sqrt{1} = 1$; consequently $Z \times 1 = Z\theta$. $Z\theta = (-1)^{\theta/\pi} Z = Z (\cos \theta + j \sin \theta)$.

Both expressions in the last equation represent rotation of the vector Z through an angle θ.

(*To be continued*)

COMING CONVENTIONS

Minnesota Telephone Association, Radisson Hotel, Minneapolis, January 25, 26 and 27.

Texas Telephone Association, Adolphus Hotel, Dallas, March 23, 24 and 25.

Oklahoma Telephone Association, Huckins Hotel, Oklahoma City, March 29 and 30.

Missouri Telephone Association, Hotel Muehlebach, Kansas City, April 4 and 5.

Iowa Independent Telephone Association, Fort Des Moines Hotel, Des Moines, April 12, 13 and 14.

Nebraska Telephone Association, Hotel Paxton, Omaha, April 19 and 20.

Kansas Telephone Association, Topeka Hotel, Topeka, April 27 and 28.

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, May 3, 4 and 5.

Indiana Telephone Association, Claypool Hotel, Indianapolis, May 11 and 12.

Pennsylvania State Telephone & Traffic Association, June 2, 3 and 4.

New York State Telephone Association, Seneca Hotel, Rochester, June 7, 8 and 9.